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Educational planners and managers are provided with the background knowledge essential to understanding and effecting planned change in education. Several dimensions of planned change are outlined and related to involvement of administrators, operational leaders, and teachers. Also presented is a model of the time-involvement dimensions for innovation in educational practice. (HW)

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Planned Change in Education

May 1968

Prepared by:
The Staff of OPERATION PEP

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PLANNED CHANGE IN EDUCATION

by

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OPERATION PEP: A State-wide Project
to Prepare Educational Planners for California

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May 1968

PREFACE

The ideas presented in this document are a synthesis of primary ideas which have evolved in many areas of the behavioral sciences. The purpose of the document is to present educational planners and managers with those background knowledges which are essential to understand and effect planned change in education.

The writer is indebted to Donald W. Johnson, Frederick McDonald, Everett M. Rogers and the staff of OPERATION PEP for the many courtesies extended during the preparation of this document.

FOREWORD

Effecting planned change in education is a complex process which can only be achieved through the involvement of people. This document outlines several dimensions of planned change and relates each dimension to involvement. In Section VI of this document, a model of the time-involvement dimensions for innovation in educational practice is presented. This model can be used to study the many aspects of planned change.

It should be noted that in the discussion of the model there can be identified a gray area of understanding. This gray area of incomplete knowledge encompasses the involvement of administrators, operational leaders and teachers in the implementation process. It is not too difficult to identify the key roles played by policy-making and management personnel, but it is difficult to trace the involvement dimensions of other staff personnel in the implementation process.

It is hoped that the model may serve educational planners and managers in the study of implementation of innovations into educational practice. It is also hoped that the participants of OPERATION PEP can explain many of the unknown factors which exist in the gray area of implementation. Certainly, educators must understand the many dimensions of involvement before they can successfully manage planned change processes.

Donald R. Miller

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I. INTRODUCTION

Educational improvement is a continuous developmental process which must be based upon desired national, state and local educational objectives. These objectives serve as bases for the description of educational products. An educational program is designed to meet needs, defined in terms of desired objectives and products, and must provide for the implementation of proven innovations and experientially-derived knowledge from exemplary programs. The implementation of promising innovations must be regarded as one of the most important tasks facing educational planners.

The patterns of dissemination of knowledge employed in the past are too slow and, subsequently, promising innovations are not widely implemented for many years. Political and school district boundaries have proven to be barriers in the processes of diffusion of innovations and their adoption into practice. A wider base for planning and coordination is needed to facilitate programs and processes of planned change.

The organization and administration of educational programs is growing more complex due to explosions of both population and knowledge. Systematic planning can provide solutions for many educational problems once the planners possess a basic understanding of educational systems and are skilled in the use of methods and techniques developed by system analysts.

Coordination of effort, dissemination of knowledge, diffusion of proven innovations and strategies for implementation of innovations are fundamental problems in the current educational dilemma. A collaborative planning approach can be envisaged for California which presents promise for the future. Since changes are inevitable and expectations of change are desirable, planning must be firmly based upon the wealth of research knowledge currently available.

Research studies related to change have revealed that a sine curve of adoption characterizes most processes of change. Studies from the fields of agriculture,[1] medicine,[2] and education[3] all reveal an initial period of time during which the acceptance of new practices takes place at a very slow rate. Studies of change, performed in the educational research tradition initiated by the late Paul Mort, reveal that only three to four percent of the school systems had accepted a new practice at the end of a fifteen year period.[4]

The early periods of educational change are characterized by activities which serve to sensitize and motivate individuals and groups to change. A period of accelerated acceptance follows resulting from selling efforts and group interaction processes. During this period individual educators and school systems interact among themselves with only a limited amount of outside influence. The rate of acceptance was found to move upward very rapidly for another period of about twenty years. Approximately seventy to seventy-five per cent more schools accepted the new practice during the second period.[5]

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[1] Everett M. Rogers, Diffusion of Innovations (New York: The Free Press of Glencoe, 1962).

[2] James Coleman and others, "The Diffusion of an Innovation Among Physicians," Sociometry XX (4), 1957.

[3] Paul R. Mort and Francis G. Cornell, American Schools in Transition (New York: Bureau of Publications, Teachers College, Columbia University, 1941).

[4] Paul R. Mort, "Studies in Educational Innovation from the Institute of Administrative Research: An Overview," Innovations in Education, Matthew B. Miles, (ed.), (New York: Bureau of Publications, Teachers College, Columbia University, 1964) pp. 317-328.

[5] Ibid.

A final period of approximately fifteen years was observed to elapse before the new idea was accepted by approximately one hundred percent of the schools.[6] The amount of selling required for acceptance has been observed to reduce significantly near the median time for acceptance by individuals within the social system.[7] The pattern of acceptance dominant in education has prompted the statement that "the average American school lags 25 years behind the best practice."[8]

Many characteristics of public schools contribute to the low rate of change exhibited in spite of the obvious need. A succinct statement of these characteristics was offered by Pierce as follows:

> Public schools are a nonprofit, noncompetitive enterprise which deal with complex human beings, their minds and their emotions. People who make decisions about the schools and their programs often do so from the frame of reference of their own era as students. The rewards of invention and innovation in education are frequently not visible. A person may be unpopular with his peers and unrewarded by the public if he becomes an agent of change in the schools. The system of lay control of schools tends to place a premium on maintaining the status quo. The basic organizational pattern of the public school system, consisting as it does of thousands of local school districts each with considerable autonomu, is not conducive to educational change. What the public expects of schools is generally such that there is little incentive to basic educational change. Educators themselves, working as they must in the conservative environment which surrounds schools, are not noted for being oriented to creative innovations.[9]

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[5] Ibid.

[6] Ibid.

[7] Rogers, pp. 257-260.

[8] Ibid., p. 2.

[9] Truman M. Pierce, Educational Change and the Role of Media. A report to the Symposium on Identifying Techniques and Principles for Gaining Acceptance of Research Results of Use of New Media in Education, Lincoln, Nebraska, November 24-27, 1963, (Lincoln: The University of Nebraska, 1963), pp. 138-153.

Educators are concerned about the slow rate of change exhibited by schools and much attention is currently being directed toward programs of planned change. One classification of variables affecting change lists individual, group, social system, and ecological variables.[10] Each class can be further analyzed into categories which exhibit interrelationships with each other. The classes and their categories can also be reciprocally interacting. Since all of these relationships create a spectrum of conditions which affect the change situation, educators advocate collaborative efforts to promote change.[11]

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[10] Wayman J. Crow, Characteristics of Leaders Who Are Able to Promote Change. A report to the Symposium on Identifying Techniques and Principles and Gaining Acceptance of Research Results of Use of Newer Media in Education Lincoln, Nebraska, November 24-27, 1963, (Lincoln: The University of Nebraska, 1963) pp. 69-88.

[11] Earnest R. Hilgard, "A Perspective on the Relationship Between Learning Theory and Educational Practices," Theories of Learning and Instruction, Sixty-third Yearbook of the National Society for the Study of Education, Part I, (Chicago: The Society, 1964) p. 404.

II. COLLABORATION AND CHANGE

Collaboration is a process of working or acting jointly, especially processes of sharing in literary, scientific or other intellectual productions.[12] Teamwork of any kind involves interaction between individuals in mutual efforts to achieve established goals. Collaboration in planned programs of change involves many human, cultural, social, and situational factors. Programs of change involve the application of personal influence in private and group settings. Many psychological and sociological research studies reveal the influence of leadership and change agents, group dynamics, group membership, and group cooperation in producing changes and increasing the productivity of groups.

Need for Collaborative Effort

Learning theory innovations originate in the minds of theoretical scientists who actively engage in basic research studies designed to test them. Results from these basic research studies must be field tested, demonstrated, and diffused to educational practitioners before any impact on practices can be effected. The complexity of influences present in the field-testing environment of the classroom may create perceptions on the part of educators which affect the adoption of the innovation. The communication network between educator and theoretical scientist frequently lacks a feedback circuit which could be utilized in clearing up false perceptions.

Most educational practitioners are not qualified to field test and demonstrate innovations; but as ultimate utilizers of educational innovations, they must become actively involved through some mechanism, thereby accelerating the adoption process. Teachers and supervisors, working in "garden-variety" schools, may be able to add experience-based intuitive flourishes to the pure form of the innovation. The pure form of an innovation is not necessarily the best form nor the one most likely to work even though it survives the rigors of research and development. An educational innovation has its final test under "garden-variety" classroom conditions. Implementation into educational practice depends upon positive evaluations made by educational practicioners regarding the success of the innovation under these conditions.

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[12] Webster's New Collegiate Dictionary, (Springfield: G. & C. Merriam Co., 1961) p. 161.

The need for collaborative efforts by educators and theoretical scientists is apparent. Other circumstances affecting educational practices also serve to point out the need for mutual endeavor. The learning theorist produces innovations which only affect one aspect of educational practices. Educational practices prevalent in classrooms of local schools are "determined by educational objectives, by the demands of mass education, by community resources, as well as by the teachings of psychology."[13]

Early reforms in education reflected sound psychological bases which still anchor most educational endeavors. Newer reforms consist of a "series of proposals designed to promote more effective means of teaching and of learning."[14] The diffusion rate for ideas emanating from reform-initiating research is reflected by two contrasting adoption behaviors exhibited by educators:

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[13] Hilgard, p. 402.

[14] Paul Woodring, "Reform Movements From the Point of View of Psychological Theory," Theories of Learning and Instruction, Sixty-third Yearbook of the National Society for the Study of Education, Part I, (Chicago: The Society, 1964) p. 290.

First, many educators do not wait until research and development programs are completed before introducing ideas from these programs into the curricula of their schools. Educators, in search of novelty, frequently accept fashionable ideas before these ideas are sufficiently developed and tested for reliability.

Second, a considerable period of time often elapses before innovations attain widespread acceptance. About fifty years usually pass between the time of development and the time of adoption of educational innovations.[15] Said in another way, "the average American school lags 25 years behind the best practice."[16] The costs of initial research studies are "an unrealized public investment until the resulting innovations are diffused to and adopted by the intended audience."[17]

Many new programs are being actively "promoted with imagination, flair, and enthusiasm, but without a great deal of psychological sophistication."[18] Yet these reforms are dominating the current efforts of educators in such areas as: "(1) technological innovations, (2) new staffing patterns, (3) program reorganization, (4) curricular reforms stressing new content, and (5) new programs for teacher education."[19] There is little doubt concerning the influence of these programs upon current educational practices. Educators have experienced new problems when they attempted to shape resulting innovations for use in classrooms. Other problems reside in the fact that many learning theorists and research psychologists, equipped with highly sophisticated statistical measures and increased financial support, have drifted farther from the educational practice. New programs often have arisen due to "social and political pressures and from widespread public discontent with the state of our educational system and the quality of the results being achieved with children."[20]

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[15] Donald H. Ross, Administration for Adaptability: A Source Book Drawing Together the Results of More Than 150 Individual Studies Related to the Question of Why and How Schools Improve, (New York: Metropolitan School Study Council, 1958). As reported by Everett M. Rogers, Diffusion of Innovation, (New York: The Free Press of Glencoe, 1962) p. 2.

[16] Rogers, p. 2.

[17] *Ibid.*

[18] Woodring, p. 290.

[19] *Ibid.*

New programs of curriculum development for American schools have created a new image of the school in the eyes of the public. The following factors have been presented as contributors to this development:

1. The scholars and scientists have gone into the classroom and, along with experienced teachers, created, tested, and revised materials and methods that incorporated the best knowledge available today.
2. The new teaching techniques which have been developed to present these new courses rely heavily upon honest and rigorous teaching of the basic concepts from the academic disciplines.
3. The new curricula represent a merging of two broad developments in our approach to learning; new understanding of the basic structure of each of the subjects taught in the schools and a new and liberating approach to our estimates of the capacity for learning inherit in children.
4. What is really behind the most successful of the new courses is the realization that research and development in education are part of a continuous process of experimentation and innovation which must involve the schools as well as the laboratory and the teacher as well as the researcher.[21]

Experimentation must be made to serve education as it has science and technology. Only through its use will educators evolve methods of "settling disputes regarding educational practices. ...verifying educational improvements and ...establishing a cumulative tradition in which improvements can be introduced without the danger of a faddish discard of old wisdom in favor of inferior novelties."[22] Designers and advocates of new curricula in science and mathematics, for example, were challenged to provide proof for their claims regarding teaching the fundamental structure of a subject. The following claims were reported to be in need of detailed study:

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[20] Ibid., p. 303.

[21] Francis A. J. Ianni, "Research and Experimentation in Education," Phi Delta Kappan XLVI (10), pp. 489-494.

1. That understanding fundamentals makes a subject more comprehensible.
2. That unless detail is placed into a structured pattern, it is rapidly forgotten.
3. That to understand something as a specific instance of a more general case...is to have learned not only a specific thing but also a model for understanding other things like it that one may encounter.
4. That by constantly re-examining material taught in elementary and secondary schools for its fundamental character, one is able to narrow the gap between "advanced" knowledge and "elementary" knowledge.[23]

Research studies which provided the psychological, human growth and development, readiness, and learning theory bases for our educational practices are in constant need of replication and cross-validation as social, cultural, and learning conditions change. Replications in a variety of test conditions are necessary before test results can be interpreted with confidence. The results of educational research and development, learning theory studies, and psychological research have served to generate many ideas for use by educational innovators. The need for collaborative efforts in the development and testing of innovations applicable to education has been reported as follows:

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[22] Donald R. Campbell and Julian C. Stanley, "Experimental and Quasi-experimental Designs for Research on Teaching," Handbook of Research on Teaching, (Chicago: Rand McNally and Company, 1963) p. 172.

[23] Jerome S. Bruner, The Process of Education, (Cambridge: Harvard University Press, 1962) pp. 23-26.

> We ought to see whether or not, in the actual context of the classroom, teachers can be helped in their dealing with students to implement these principles with the aid of appropriately designed materials and training in their use, supplemented with tests to see whether or not the desired advances are indeed forthcoming. In other words, we believe that scientific psychology of learning has the obligation to go all the way from theory to practice, using criticized data in every step. This involves a division of labor, of course, but with collaborative effort and mutual good will all along the line.[24]

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[24] Ernest R. Hilgard, "Postcript: Twenty Years of Learning Theory in Relation to Education," Theories of Learning and Instruction, Sixty-third Yearbook of the National Society for the Study of Education, Part I, (Chicago: The Society, 1964) p. 418.

III. DIFFUSION OF EDUCATIONAL INNOVATIONS

A Model of the Adoption of an Innovation by an Individual in a Social System

A model of the adoption of an innovation by an individual, as shown in Figure 1, "contains three major divisions: (1) antecedents, (2) process, and (3) results."[25] This model may prove valuable for diffusion research studies in education because it was derived from research studies in the behavioral sciences. Application of the modular components to the parallel factors present in the social system of a school may reveal many implications regarding the diffusion of educational innovations.

Antecedents to Adoption

Antecedents are those factors present in an individual's situational field prior to the time of introduction of an innovation. The antecedents generate influential forces which will directly affect the individual's degree of involvement in a process of adoption. An individual's behavior in any environment is: (1) oriented toward goal attainment, (2) influenced by situations, (3) normatively regulated, and (4) involves an expenditure of effort.[26] The two principal types of antecedents indicated in the model are: (1) the educator's identity, and (2) his perception of his situational field.[27]

The Educator's Identity:

The educator's identity, according to the model, would include such personal

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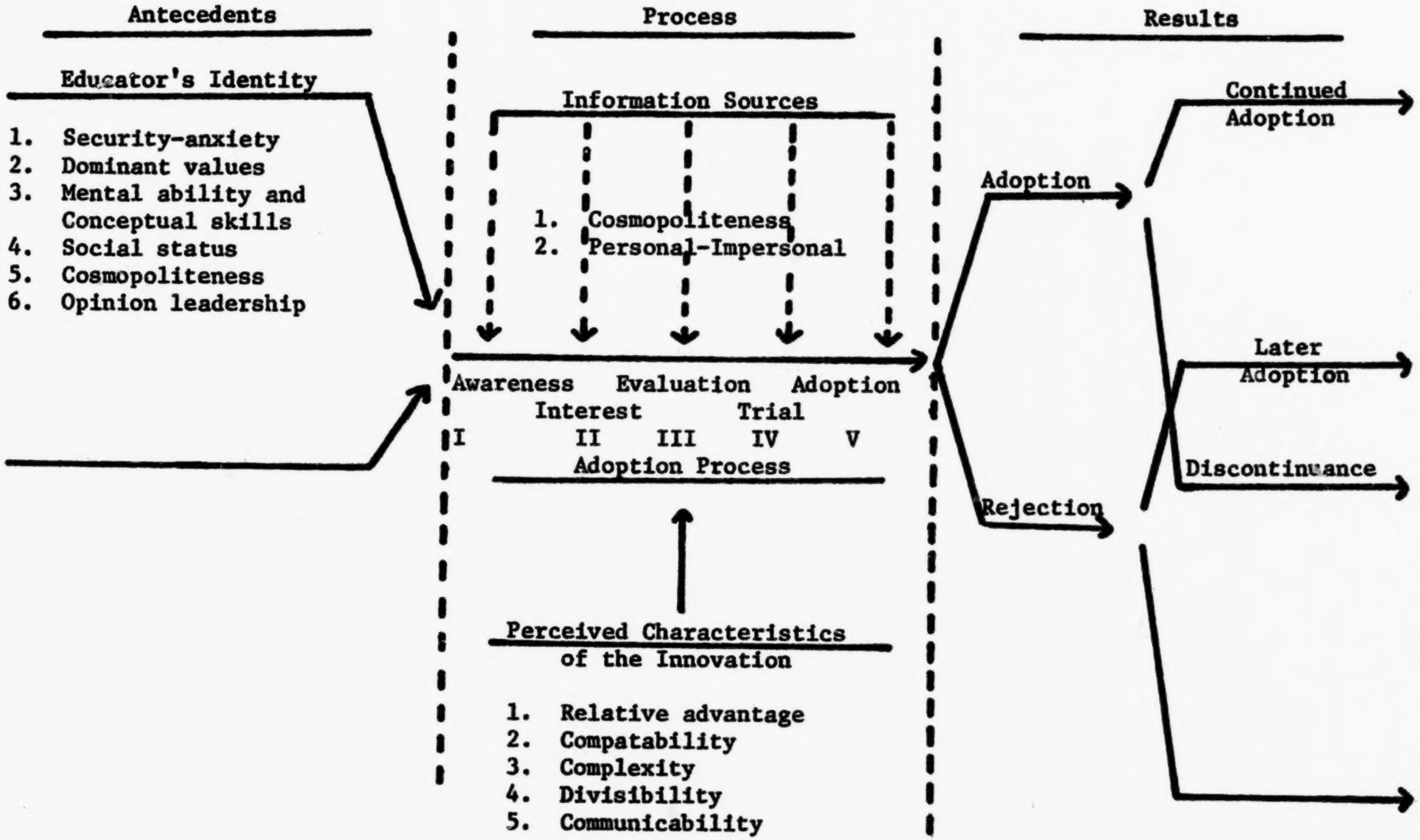
[25] Rogers, p. 305.

[26] *Ibid.*, p. 301.

[27] *Ibid.*

FIGURE 1

A MODEL OF THE ADOPTION OF AN INNOVATION BY AN INDIVIDUAL WITHIN A SOCIAL SYSTEM*



*Adapted from Everett M. Rogers, Diffusion of Innovations, (New York: The Free Press of Glencoe, 1962) p. 306

characteristics as: (1) sense of security, (2) dominent values, (3) mental ability and conceptual skill, (4) social status, (5) cosmopoliteness, and (6) opinion-leadership ability.[28]

Individuals seek the ultimate goal of interpersonal security. Since security is a subjective state of well-being that minimizes tension, individuals actively try to avoid those situations which create undesired anxiety levels. The sources of anxiety include: (1) blocking of desires, (2) sudden or strong stimuli, (3) new situations, (4) loss, or threat of loss, of continuity with the past, (5) demands from other persons, and (6) pain.

The dominant values shared by educators are those common to middleclass people.[29] Educators are impressed with many common psychological, social, moral, and aesthetic values. Some educators who have experienced upward or downward class mobility may foster residual dominant values characteristic of the lower or upper classes respectively.

The range of mental abilities and the degrees of conceptual skill attainment exhibited by educators is quite pronounced. An individual educator usually possesses an average or above mental ability and exhibits a high conceptual skill attainment within his area of specialization. Nevertheless. educators as individuals, may be classified into groups due to wide variances in individual abilities and conceptual skills attainment.

The social status of educators, as perceived by other individuals in a social system, depends somewhat on the average level of educational attainment of individuals in the social system. In some areas educators are never identified as members of the social system but are considered as outsiders. Social systems having modern norms readily accept educators as members of the scientific and technological community. Educators generally, unless they possess exceptional characteristics, never attain higher than an opinion-leadership status.

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[28] Ibid., p. 307.

[29] Robert J. Havighurst, "Social-Class Influences on American Education," Social Forces Influencing American Education, Sixtieth Yearbook of the National Society for the Study of Education, Part II, (Chicago: The Society, 1961) p. 131.

Educators frequently exhibit a high degree of cosmopoliteness because they are usually educational products of institutions outside the social system in which they practice. These contacts established during the formative years are frequently carried over into professional lives. The job mobility of professional educators also serves to enhance the degree of cosmopoliteness exhibited. Educational specialists, whatever their field, maintain external contacts who function as information sources.

Educators are opinion leaders in the eyes of their students and the adult community in which they practice. Estimations of opinion leadership status made by peers would indicate which educators function as opinion leaders in the profession. The opinion leadership ability of individual educators may be assessed by: (1) sociometric techniques, (2) use of key informants, and (3) utilizing a self-designing questionaire technique.[30] In general, most educators exhibit an above average opinion-leadership ability in their social systems.

An Educator's Perception of His Situational Field:

An educator's perception of his situational field regarding the adoption of innovations depends upon: (1) social system's norms on innovativeness, (2) economic constraints and incentives, and (3) characteristics of the school[31] (the characteristics of the school include administrative and professional constraints). The social system perceived by an educator may be either an individual school or a school system.

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[30] Rogers, pp. 228-232.

> According to role theory, organizations are social systems made up of people who occupy various "positions" in vertical (hierarchical) and horizontal relationship to each other. Any given position is the location of one individual or class of individuals within the social system.[32]

A school's norms on innovativeness directly influence an educator's perception of the school in terms of his evaluation of their appropriateness or inappropriateness. The norms of innovativeness possess a behavior dimension for every educator in the school. An individual may perceive his role quite differently than that perceived for him by other members of the social system. Another ramification of the behavior dimension would be the failure of an individual to truly perceive the roles other persons play in the social system. The individual's perception of norms on innovativeness and his role in the social system may either fall short or exceed the true expectations of the system. A social system's norms on innovativeness are also subject to an evaluation dimension. An evaluation of any group norm involves shared tendencies of approval and disapproval of behavior acts. An individual must seek out the social system's range of tolerable behavior regarding innovations before he can attain a comfortable degree of interpersonal security. Norms on innovativeness, especially in traditional schools, tend to become crystallized due to previous situations or situations generated by the interaction of current group members. The adoption process for an individual is directly affected by his perception of the school's norm on innovativeness. A school having modern social norms would be perceived as stimulating, encouraging and supporting of innovative behavior.

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[31] Ibid., pp. 306-307.

[32] Richard C. Lonsdale, "Maintaining the Organization in Dynamic Equilibrium," Behavioral Science and Educational Administration, Sixty-third Yearbook of the National Society for the Study of Education, Part II, (Chicago: The Society, 1964) p. 149.

The economic constraints and incentives of a school toward innovation would include such factors as: (1) the costs involved in innovation, (2) the availability of resources and materials, (3) the rewards for innovative behavior, (4) the availability of time, and (5) the economic attitude of the school community.

Many educational innovations never reach the trial stage due to the financial limitations of schools. Other innovations are curtailed because necessary resources and materials cannot be made available to the innovator even though they are present in the school. Many schools grant positive rewards to innovators by instituting merit pay plans while other schools view innovators through hostile eyes. The crowded schedules and overcrowded facilities of some schools often create conditions wherein innovators are unable to secure sufficient time for trial endeavors. The norms of a school community may facilitate innovation by creating a cooperative environmental atmosphere but an opposite extreme might be experienced in a school community possessing traditional norms. A continuous appraisal of school and community economic constraint and incentive behavior affecting innovativeness is essential. An educator's perception of this behavior, as it affects his situation, will strongly influence the degree of innovativeness exhibited.

The characteristics of the school which influence an educator's perception of the innovative situation includes: (1) administrative constraints, (2) professional constraints, (3) student constraints, and (4) school community constraints. Administrative constraints may be related to administrative and organizational procedures, types of leadership, and leadership attitudes. Professional constraints emanate from educators' perceptions of peer attitudes, philosophies and positions of professional groups and the established interrelationships between educators. Student constraints which impress individual perception of innovative situations would include the characteristic personal qualities of cooperativeness, agreeableness, cheerfulness, etc. Another student-linked constraint might emanate from a perceived inability to generate rapport or induce student involvement. An individual's perception of the innovative situation will be influenced by the attitudes shared by parents and organized community groups. Educators try to avoid climbing out on "innovative limbs" which may be cut from under them. Educators are usually cautious professionals who tend to feel out the school community for solid support before they innovate.

Thus an educator's identity and his perception of the situational field will influence his adoptive behavior. An individual operates in a complex socio-psychological field of influence which helps to formulate his pattern of behavior. Constraints may be present at every level of interaction of the individual and the organization. A model of these interaction levels has been used to demonstrate the relationships between the individual and the organization (see Figure 2).[33] The diffusion of innovations within a social system is thus seen as a process which can be accelerated when constraints are minimal and rewards are maximal.

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[33] Ibid., p. 143.

Process of Adoption

Any idea that is perceived as new by an individual is an innovation. Since all individuals are members of a social system, the innovations adopted by them are slowly diffused to other members of the social system. "There are four crucial elements in the analysis of the diffusion of innovations: (1) the innovation, (2) its communication from one individual to another, (3) in a social system, and (4) over time."[34]

The Nature of Innovations Affect Their Individual Rates of Adoption:

The nature of an innovation will affect its rate of adoption and subsequent diffusion. An individual's perception of an innovation will strongly influence his adoption decision. A particular innovation may be perceived as superior to the idea it supersedes and thus offers a relative advantage to its adopters. A local, regional, or national crisis may serve to emphasize the relative advantage of an innovation and influence its adoption rate. An innovation's compatibility with the existing values and past experiences of adopters contributes to its rate of adoption. The complexity of an innovation may cause it to be perceived as too difficult to understand use. The degree to which an innovation is divisible will affect its trial rate and its subsequent adoption. Certain innovations produce results which are readily and easily observed and communicated; and thus, they are said to exhibit a high degree of communicability. Each innovation is perceived by observers to possess varying degrees

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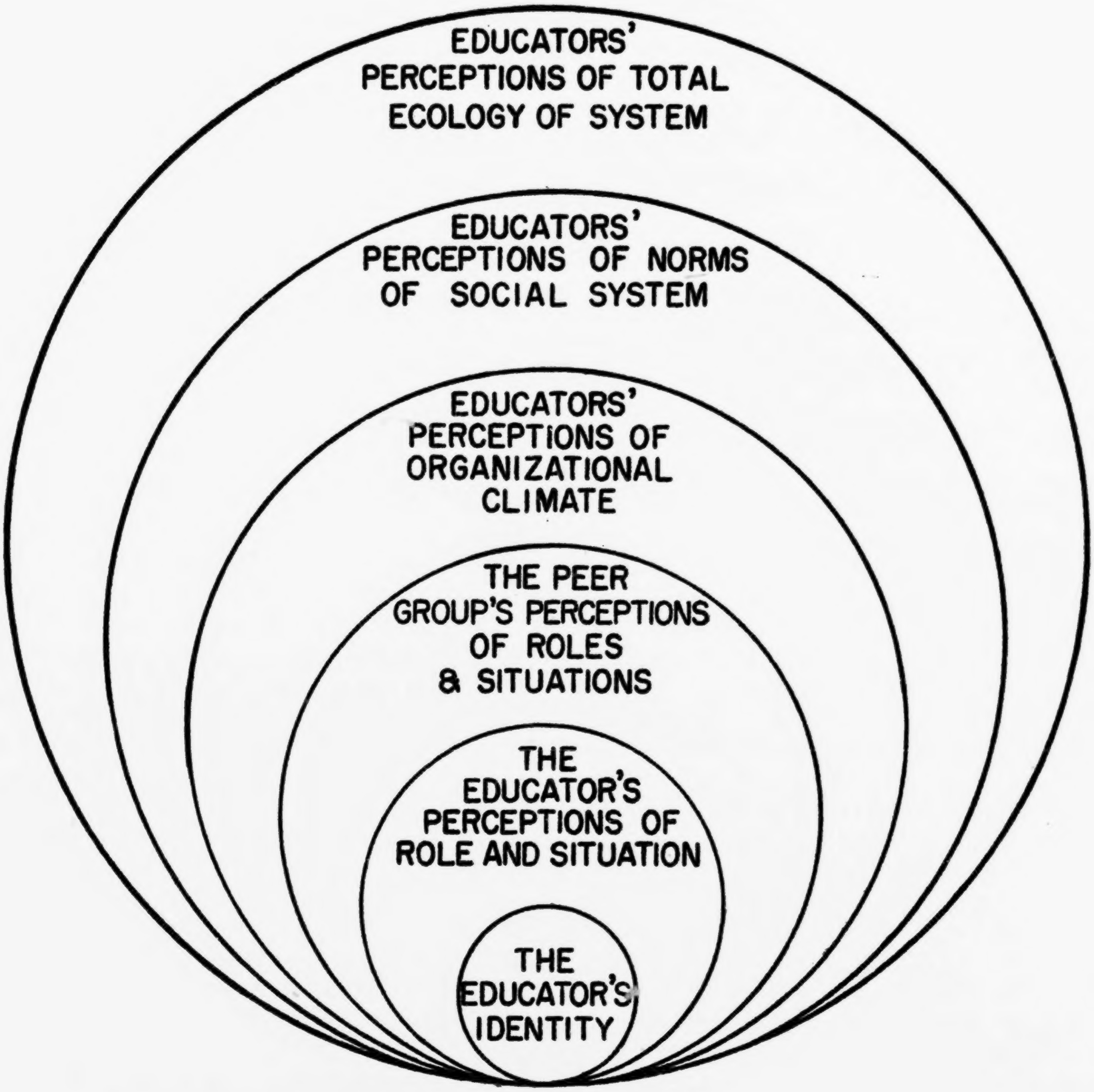
[34] Rogers, p. 12.

FIGURE 2

DOMAINS OF BEHAVIORAL INFLUENCE IN SCHOOL ORGANIZATION

THE BEHAVIOR OF EDUCATORS IS INFLUENCED BY INDIVIDUALS' PERCEPTIONS OF IDENTITIES, ROLES, SITUATIONS, TASK-ACHIEVEMENTS, NEEDS-SATISFACTIONS SOCIAL SYSTEM NORMS AND TOTAL ECOLOGY.


EDUCATORS' PERCEPTIONS OF TOTAL ECOLOGY OF SYSTEM
EDUCATORS' PERCEPTIONS OF NORMS OF SOCIAL SYSTEM
EDUCATORS' PERCEPTIONS OF ORGANIZATIONAL CLIMATE
THE PEER GROUP'S PERCEPTIONS OF ROLES & SITUATIONS
THE EDUCATOR'S PERCEPTIONS OF ROLE AND SITUATION
THE EDUCATOR'S IDENTITY

[ADAPTED FROM RICHARD C. LONSDALE, "MAINTAINING THE ORGANIZATION IN DYNAMIC EQUILIBRIUM," IN BEHAVIORAL SCIENCE AND EDUCATIONAL ADMINISTRATION. EDITED BY DANIEL E. GRIFFITHS. (CHICAGO: NATIONAL SOCIETY FOR THE STUDY OF EDUCATION, 1964.), P. 143.]

of the following characteristics: "(1) relative advantage, (2) compatibility, (3) complexity, (4) divisibility, and (5) communicability."[35]

Communication is an Essential Feature in the Process of Adoption:

The communication of information characterizing an innovation, between individuals of a social system, is an essential feature of the adoption and diffusion processes. The communication network of a social system features both personal and impersonal communication linkages. "Personal communications involve a direct face-to-face exchange between the communicator and receiver,"[36] while impersonal communications do not involve such direct exchanges of information. Impersonal communications play an important role in the adoption process by providing innovators with an initial knowledge of innovations. Innovators and early adopters use more information sources and maintain closer contacts with sources of innovations than do other members of the social system. They also utilize more impersonal and cosmopolite information sources which establish external communication linkages for the social system. Individuals designated as belonging to other adopter categories: early majority, late majority and laggards frequently establish personal communications with the innovator and early adopter who may be regarded by them as opinion leaders in the social system.

The communication network of a social system facilitates the adoption process. The adoption process is considered a type of mental process since it involves a decision-making act on the part of the adopter. The stages of the adoption process are: "(1) awareness, (2) interest, (3) evaluation,

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[35] Ibid., p. 124.

[36] _Ibid_., p. 98.

(4) trial, and (5) adoption."[37] The individual gains his initial knowledge of the new idea during the awareness stage. An interest is created which causes the individual to seek more information about the idea (interest stage). Based upon the information attained, the individual engages in a mental trail of the innovation in full light of the factors present in his own situation (evaluation stage). During the interest and evaluation stages the individual usually seeks sources of information regarding the innovation. Upon completion of a mental evaluation, the individual may make one of the following decisions: (1) adopt the innovation, (2) try the innovation, or (3) reject the innovation. The use of a trial stage will largely depend upon the adoption status of the innovation in the social system. The adoption process is revealed as a process relating innovations to individuals while the diffusion process relates innovations to the social system.

The Social System is a Vital Factor in the Adoption Process:

The social system is a crucial element in the analysis of diffusion of innovations. The situational field perceived by an individual to exist, as a part of his environment in the social system, will strongly influence his adoption rate. Although some individuals will adopt innovations regardless of the decisions of other individuals in the social system, some innovations require a majority group decision before individual adoption decisions are possible. Under certain circumstances group adoption decisions will force individuals to accept innovations. The norms of the social system will strongly influence individuals' adoption rates. Therefore, the rate of diffusion for an innovation reflects somewhat the type of social norms prevalently shared by individual members of the system. The innovations presented by change agents (professional persons who attempt to influence adoption) are more readily accepted in social systems possessing modern norms.

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[37] Ibid., p. 81.

Time as a Factor in the Process of Adoption:

The diffusion of any innovation involves an element of time. Considering that each individual requires a characteristic adoption period for each innovation, the diffusion rate for an innovation is dependent upon both the adoption rate and the rate of flow of communications. Thus, based upon time intervals, individuals may be classified into the following adopter categories: "innovators, early adopters, early majority, late majority, and laggards."[38] These categories reflect the degrees of innovativeness exhibited by individual members of a social system. The rate of flow of communications is influenced by a time-linked process called the interaction effect. This linkage depends upon the relative period of time involved between the invention of an idea and its adoption by an individual in a social system. The innovator, within a social system, initiates the interaction process which facilitates diffusion. As other members of the social system interact, a "snowball effect" may be created which speeds up the diffusion rate for the innovation.

Results of Adoption

The results of adoption is reflected by observable behavior changes in individuals and in the social system as a whole. The original form of an innovation may be modified to accommodate the unique characteristics perceived to exist within the social system. Further, individuals may make substitutions for those factors perceived to be missing from the social system yet essential for success in the innovative experience. Educational innovations are rarely adopted in their pure form due to the influence of situational factors, individuals' perceptions, peer group attitudes, administrative attitudes, and the dominant social norms prevalent in the school community.

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[38] Ibid., p. 19.

An individual is able to evaluate the worth of an innovation only after trial. The trial stage of the adoption process has as its main function the demonstration of the new idea on a small scale in the individual's own situation. The results obtained from the trial will enable the individual to adopt the innovation and continue its use. An individual may also reject an innovation because the results of trial prove undesirable. The adoption process is a mental evaluative process of decision which prompts the adoption or rejection of an innovation.

An innovation rarely continues in full adoption, because individuals frequently discontinue the use of innovations due to unsatisfactory experiences, based on misunderstanding of the innovation, or the introduction of another idea which supersedes the original. Other individuals, who at first reject the innovation, may at a later date make a decision to adopt it. Other persons who initially rejected an innovation will persist as nonadopters.

A framework for the identification of forms of rejection and a diagram of rejection theory have been presented by Eichholz and Rogers. Table 1 reveals the framework for the identification of forms of rejection and Figure 3 reveals a modular theory of rejection.

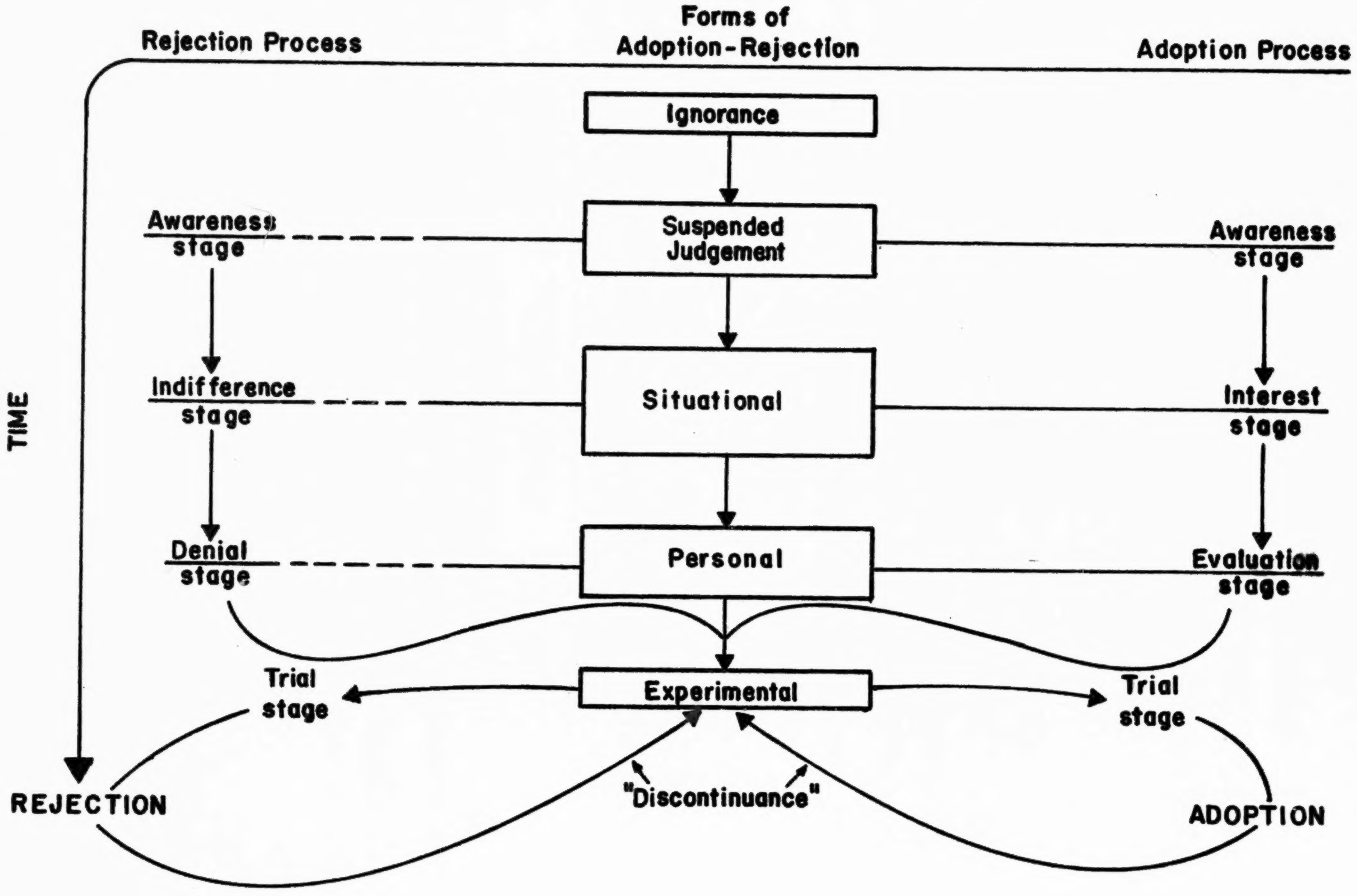
TABLE I

A FRAMEWORK FOR THE IDENTIFICATION OF FORMS OF REJECTION*

Form of Rejection	Cause of Rejection	State of Subject	Anticipated Rejection Responses
1. Ignorance	Lack of dissemination	Uniformed	"The information is not easily available."
2. Suspended judgment	Data not logically compelling	Doubtful	"I want to wait and see how good it is, before I try it."
3. Situational	Data not materially compelling	1. Comparing	"Other things are equally good."
		2. Defensive	"The school regulations will not permit it."
		3. Deprived	"It costs too much to use in time and/or money."
4. Personal	Data not psychologically compelling	1. Anxious	"I don't know if I can operate equipment."
		2. Guilty	"I know I should use them, but I don't have time."
		3. Alienated (or estranged)	"These gadgets will never replace a teacher." (If we use these gadgets, they might replace us.")
5. Experimental	Present or past trials	Convinced	"I tried them once and they aren't any good."

*Gerhard Eichholz and Everett M. Rogers, "Resistance to the Adoption of Audio-visual Aids by Elementary School Teachers: Contrasts and Similarities to Agricultural Innovation," Innovation in Education, Matthew B. Miles (ed.), (New York: Bureau of Publications, Teachers College, Columbia University, 1964, p. 310.

Diagram of Revised Rejection Theory * FIGURE 3



* AFTER GERHARD EICHHOLZ AND EVERETT M. ROGERS. INNOVATION IN EDUCATION. MATTHEW B. MILES (ED) (NEW YORK: TEACHERS COLLEGE, COLUMBIA UNIVERSITY, 1964) P. 311.

IV. THE LEADERSHIP ROLE OF CHANGE AGENTS IN THE IMPLEMENTATION OF INNOVATIONS

A change agent is "a professional person who attempts to influence adoption decisions in a direction that he feels is desirable."[39] The educational change agent may be a commercial salesman of educational materials, a teacher or professor, an administrator, a community opinion leader, or a supervisor. Change agents actually perform many leadership functions in their attempts to influence changes in behavior. As sources of cosmopolite influence, change agents seek to establish communication linkages with individuals, groups, and organized systems.

A model for the "pragmatic advocate" has been forwarded by Gallaher. The role of the pragmatic advocate is concerned mainly with the creation of a climate conducive to acceptance of change. The success of such advocates resides mainly on several kinds of understandings about the system to be changed. Among these are the following understandings:

1. An understanding of the values held by accepting groups, advocate, and those represented by the innovation.
2. An understanding of the value system into which change is being introduced. This value system influences the judgments of potential acceptors concerning the worth of new and old elements.
3. An understanding of areas of expected change, or the possibilities of creating areas of expected change, which might serve as an essential system of expectations to facilitate changes in long-range development plans. (A system of expectations promotes a greater willingness to examine alternatives.)

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[39] _Ibid._, p. 17.

4. An understanding of the social structure to be changed including such factors as: (a) an awareness of communication linkages which relate advocates to potential adopters, (b) an awareness and control of rewards regarded as valuable by potential acceptors, (c) the power and sanctions that the advocate controls, (d) the prestige and power structure present in the system, and (e) the role of recognized authority, upon whom people depend, in the change process.[40]

Change agents have perceived their role as one of basic education, while their clients viewed them as providing other services.[41] Research results indicate that "change agents reach the upper social status portion of their clientele disproportionately more than the lower strata."[42] "The extent of promotional efforts by change agents is directly related to the rate of adoption of an innovation."[43] Another study suggests that this is true until a certain percentage of adoption is achieved after which time the change agent may more effectively use his time by encouraging group interaction processes promoting diffusion of innovations.[44]

Leadership and Change Agents

Leadership in planned programs of change has been defined as, "the activity of producing change in the thoughts and actions of individuals in interaction."[45] A more complete definition of leadership was presented by Good as:

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[40] Art Gallaher, The Role of the Advocate and Directed Change. A report to the Symposium on Identifying Techniques and Principles for Gaining Acceptance of Research Results of Use of New Media in Education, Lincoln, Nebraska, November 24-27, 1963, (Lincoln: The University of Nebraska, 1963) pp. 17-39.

[41] Rogers, p. 17.

[42] Ibid., p. 257.

[43] Ibid., pp. 257-258.

[44] Ibid., p. 260.

> 1. the ability and readiness to inspire, guide, direct, or manage others;
>
> 2. the role of interpreter of the interests and objectives of a group, the group recognizing and accepting the interpreter as spokesman.[46]

The behavioral sciences no longer limit leadership ability to individuals endowed with special abilities due to personal characteristics. Instead leadership acts are viewed as, "skills, which with learning and practice, can be employed effectively by any number of members within a group."[47]

One explanation for the evolution of leaders in social and cultural settings has been presented by Crow:

> The individual lives out his life under the almost constant influence of others. It is an inescapable biological condition that man is born of woman and is dependent for his infant existance on another human being. Human nature is thus a social nature and starting from these beginnings this nature develops in the context of the family, the tribe or neighborhood, the community or society. Whenever two or more people are in contact there we will find a leader. One or the other will take a more active role, be heard with more effect, or be more influential in determining the outcomes of the contact.[46]

Leaders and the Group

Effective leadership involves certain personal characteristics, personality traits, human qualities, and group understandings. "A leader stimulates and encourages full, frank, and friendly participation from the members of a group."[49] A leader must help to establish and maintain a warm and permissive atmosphere in which group members feel comfortable and secure. The members of a group experience peer relationship with the group leader. This relationship materially aids the group in the establishment of a communication network.[50] Hemphill has described the following list of the six principal functions of successful leaders in order of importance beginning with number one:

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[45] Crow, p. 78.

[46] Carter V. Good (ed.), Dictionary of Education, (New York: McGraw-Hill Book Co., 1959) p. 313.

[47] Crow, p. 77.

[48] Ibid., p. 70.

1. Set group goals with the members of the group.
2. Help the group reach its established goals.
3. Coordinate the efforts of the group members.
4. Help the members fit into the group.
5. Maintain interest in the group as a unit not one's self.
6. The human-ness of the group leaders.[51]

The personal qualities of effective leaders are pointed out in many studies. Chowdhry and Newcomb found that chosen leaders were superior to non-leaders in estimating group opinion on matters of high relevance to the group.[52] Investigations by Hackman and Moon indicated that the same individuals were nominated both as leaders and group members.[53] Carter pointed out that emergent leaders were those who analyzed situations accurately and initiated the action required under the circumstances.[54] The work of Bell and Hall indicated that persons selected as leaders were perceptive of the needs of group members.[55] Ross and Hendry viewed empathy, consideration and surgency as the three personality characteristics generally common to elected leaders. Thus, elected leaders exhibit abilities to: (1) identify with, and respond to, the emotional needs of group members or become the object of identification for group members, (2) be recognized for their thoughtfulness and sympathetic regard for the worth of every group member, and (3) stimulate enjoyment in others during interaction due to personal warmth and congeniality.[56]

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[49] Franklyn S. Haiman, Group Leadership and Democratic Action, (Boston: Houghton-Mifflin Co., 1951) p. 4.

[50] Joseph B. Gittler (ed.), Review of Sociology: Analysis of a Decade, (New York: John Wiley & Sons, Inc., 1957) p. 395.

[51] J. K. Hemphill, "Situational Factors in Leadership," Ohio State University, Columbus, Ohio, Personnel Research Board, Leadership Studies No. 4, 1949, pp. 1-136. As reported by Donald A. Laird, and Eleanor C. Laird, The New Psychology for Leadership, (New York: McGraw-Hill Book Co., 1956) pp. 65-69

[52] Kalma Chowdhry and Theodore M. Newcomb, "The Relative Abilities of Leaders and Non-leaders to Estimate Opinions of their Own Groups," The Journal of Abnormal and Social Psychology, 47, 1952, p. 57.

Group size has been shown to be related to the development of emergent leaders. Bales has reported that as a group works together a top participator emerges. This person tends to exceed by larger amounts his proportionate share of the group activity as the group grows larger.[57] Pruitt has shown that frequently less agressive members in large groups will align themselves with strong leaders supporting opposing views regarding controversial issues creating sub-groups.[58] Hemphill points out that as a group grows larger there is increasing tolerance for leader-centered direction of group activities and the leadership role becomes more firm and impartial in enforcement of rules.[59]

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[53] Roy C. Hackman and Resford G. Moon, "Are Leaders and Followers Identified by Similar Criteria?", The American Psychologist, 5, 1950, p. 312.

[54] Launar F. Carter and others, "The Behavior of Leaders and Other Group Members," The Journal of Abnormal and Social Psychology, 46, 1951, p. 595.

[55] C. B. Bell and H. E. Hall, "The Relationship Between Leadership and Empathy," The Journal of Abnormal and Social Psychology, 49, 1956, p. 156.

[56] Murray Ross and Charles E. Hendry, New Understandings of Leadership, (New York: Association Press, 1957) pp. 43-52.

[57] R. F. Bales, "The Equilibrium Problem in Small Groups." As reported by T. Parson and others, Working Papers in the Theory of Action, (New York: The Free Press of Glencoe, 1953) pp. 111-161.

Leaders Can Be Trained

Research has demonstrated that group leaders can be trained to be more effective in developing practices which increase group productivity. Battin, while working with college students, found that discussion group leadership could be developed through group participation. Using small groups, group leadership ability was fostered by active participation in group discussion and taking turns as the discussion leader. Individual's ideas were exposed to group thinking and a more effective way of thinking slowly emerged according to participants.[60]

Sterling and Rosenthal have indicated that leaders and group members do change roles with different psychological phases of group process.[61] This would support the practice of Battin of having group members take turns being discussion leaders as topics of discussion changed. A further implication might be that maximum group effectiveness necessitates that the leadership role be changed with changing psychological phases of group interaction.

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[58] Wilton Pruitt, "Group Size and Organizational Planning," Personnel and Guidance Journal, 38, 1960, p. 628.

[59] J. K. Hemphill, "Relations Between the Size of the Group and the Behavior of 'Superior' Leaders," Journal of Social Psychology, 32, 1950, pp. 11-22.

[60] Charles T. Battin, Report of Three Years Experimentation with a Course Designed for College Students to Develop Their Ability to Lead Discussion Groups, U. S. Office of Education, Vocational Division, May, 1940, pp. 1-39.

[61] Theodore D. Sterling and Bernard G. Rosenthal, "The Relationship of Changing Leadership and Followership in a Group to the Changing Phases of Group Activity," The Professional Journal of the American Psychological Association, 5, 1950, p. 311.

Leadership training investigations by Maier revealed that eight hours of leadership training produced a marked difference in the outcome of group discussion. Maier trained leaders for eight hours on the following points:

1. Present the problem, but not the proposed solution.
2. Get each man to suggest a solution.
3. Let each air his personal views, without arguing with him.
4. Answer questions, or refer to someone else in the group.
5. Be tolerant of their criticisms, without talking back.
6. Keep them talking with each other (interacting) on the problem...
7. until they are ready to reach a group decision.[62]

Participatory leadership was shown to be more effective in producing changes in attitudes according to research by Preston and Heintz.[63] Thus, changes in educational attitudes can be more readily achieved through group participation in decision making. The principal objective of leadership training would be to change or modify negative attitudes toward group interaction and develop in each participant awareness of the personality traits, leadership functions, and expected modes of behavior for leaders active in a collaborative setting.

A Strategy of Change Involving Change Agents

A five-point general strategy of change which should apply to a broad range of change agent-client relationships has been presented by Everett M. Rogers.[64] The five recommendations presented in the strategy of change are as follows:

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[62] N. R. F. Maier, "An Experimental Test of the Effect of Training on Discussion Leadership," Human Relations, 6, 1953, p. 161.

[63] Malcolm G. Preston and Ray K. Heintz, "Effects of Participatory vs. Supervisory Leadership on Group Judgment," The Journal of Abnormal and Social Psychology, 44, 1949, pp. 345-355.

1. A program of change should be tailored to fit cultural values and past experiences.
2. A change agent's clients should perceive a need for an innovation before it can be successfully introduced.
3. Change agents should be more concerned with improving their client's competence in evaluating new ideas and less with simply promoting innovations per se.
4. Change agents should concentrate their efforts upon opinion leaders in the early stages of the diffusion of an innovation.
5. The social consequences of innovations should be anticipated and prevented if undesirable.

Each recommendation in the strategy can be regarded as a group-centered area of concern for change agents. The change agent must be thoroughly versed in group dynamics before he will be able to exercise his leadership ability as a positive force in processes of planned change. A knowledgeable background in group dynamics is essential before change agents will be able to lead group members to engage collaboratively in processes of evaluation, adoption and implementation of innovations in educational practice.

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[64] Rogers, pp. 278-282.

V. GROUP DYNAMICS AND PROCESSES OF CHANGE

Four variables in group dynamics may be determined or controlled to some extent before group interaction is initiated in a process of change. These variables include: group size, the communication network, the nature of the group task, and the personalities of the group members.[65] In addition, group membership and cooperation creates strong motivational forces in patterns of acceptance of change.

Group Size as a Factor in Change

An individual can pay attention to only a limited number of persons at a given time. As group size increases, it becomes more difficult for individuals to keep the other group members in mind as separate differentiated individuals. These conditions necessitate that group size be carefully controlled to insure productivity. Thelen has reported "The Principle of Least Group Size" as follows:

> The size of a group should be the smallest group in which it is possible to have represented at a functional level all the achievement (content resources) and socialization (group process) skills required for the particular learning activity (task) at hand.[66]

The early stages of group activity is usually marked by few accomplishments. Pruitt has indicated that this is due to the fact that each person is reluctant to reveal himself until "he can determine the kind of people, their status, their resources, their abilities and skills, who make up the group." In addition, Pruitt maintains that group action is limited by "the number of relationships individuals are able to maintain continuously within the group's system of interactions."[67] Research by Kephart has indicated that there is a rapid increase in the number of possible relationships with increases in group size.[68] Pruitt has demonstrated that as a group grows larger there is a tendency to become more selective in establishing relationships and to block out a number of persons.[69]

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[65] Robert F. Bales and others, "Structure and Dynamics of Samll Groups: A Review of Four Variables," Review of Sociology: Analysis of a Decade, Joseph B. Gittler (ed.), (New York: John Wiley & Sons, Inc., 1957) pp. 391-422.

[66] H. A. Thelen, "Group Dynamics in Instruction: Principle of Least Group Size," School Review, 57, 1949, pp. 139-148.

As the size of a group increases, individuals find it increasingly difficult to maintain vital interrelationships with other group members. Members tend to withdraw and thereby cause the consensus to change slowly. Mechanical processes related to maintenance of group organization will become more demanding thus lowering productivity and reducing opportunities for individuals to engage in processes of change. Thelen has stated that as a group grows larger:

1. Less time is available for each person to test his ideas directly through overt participation.
2. Less pressure is felt by the individual to participate and the fact of his non-participation is less visible.
3. More difficulty is experienced in expressing intimate thoughts and feelings.
4. The tendency is greater to just "sit tight" and let someone else do the job.
5. The influence, either positive or negative, of each individual upon group thinking, is lessened.
6. The tendency is to feel less responsibility for meeting the demands of the group's task.[70]

Bass and Norton have reported that group size limits opportunities for individuals to assume leadership roles. They also noted a significant decline in the rated quality of leadership of participants generally as the size of the group increased.[71]

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[67] Pruitt, pp. 626-632.

[68] William M. Kephart, "A Quantitative Analysis of Intragroup Relationships," American Jouranl of Sociology, 55, 1960, pp. 544-549.

[69] Pruitt, p. 628.

[70] H. A. Thelen, Dynamics of Groups at Work, (Chicago: University of Chicago Press, 1956) pp. 62-67.

The Communication Network as a Factor in Change

A group communication network has been defined as "the patterns and channels of communication among members and subgroups of the group."[72] The pattern of communication within any group directly affects the participation of individual members of the group and the group's productivity. Leavitt found that the group in which all persons had access to all information was more productive. Groups in which a centrally-located individual served as a clearinghouse for ideas were more accurate and more productive in the beginning, but decreased in effectiveness because the persons in peripheral positions did not have access to all information and lost interest in the group activity.[73]

A group communication network which lacks feedback will impair the accuracy and mutual confidence of both the sender and the receiver. Leavitt and Mueller found that free feedback in the communication network contributed to group productivity. Their test groups which were kept informed of ideas that had been presented and of progress toward conclusions were more accurate in their analysis of the group situation and the status of group thinking.

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[71] B. M. Bass and Fay-Tyler M. Norton, "Group Size and Leaderless Discussion," Journal of Applied Psychology, 35, 1951, pp. 397-400.

[72] Bales and others, p. 402.

[73] Harold J. Leavitt, "Some Effects of Certain Communication Patterns on Group Performances," The Journal of Abnormal and Social Psychology, 46, 1951, pp. 38-50.

Thus, free feedback was presented as an aid to accuracy in inter-personal communications. They reported that "free feedback seems to permit the participants to learn a mutual language, which language once learned, may obviate the necessity for further feedback."[74]

A circular pattern of communication presents each individual member of the group with greater independence of action. Bales has stated that "the circular pattern permits members to adapt more readily to a change requiring the breaking and relearning of a previously established set."[75] All members of the group network will exhibit specific individual activity rates in communication. The tendency is that members who talk most also receive the most communication. This is probably due to the fact that people tend to address that member of a group who spoke last.[76] An open pattern of communication in an organizational system probably presents the greatest possibilities for effecting individual and group change.

Nature of the Group Task and Individual Change

The nature of the group task will strongly influence individuals involved in processes of change. Bales has presented the following definition for group task:

> The task is, in the most pertinent sense, what group members subjectively define it to be as they respond to the situation in which they find themselves, all of the internal features of the system are likely sooner or later to become relevant to its specification.[77]

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[74] Harold J. Leavitt and Ronald H. A. Mueller, "Some Effects of Feedback on Communication," Human Relations 4, 1951, pp. 401-410.

[75] Bales and others, pp. 402-409.

[76] Ibid.

[77] Ibid., p. 409.

When the group task pertains to the implementation of innovations into educational practices, certain aspects of the innovation itself affects group perceptions of the task. Miles has reported the following properties of innovation as pertinent in adoption processes:

1. Cost--innovations requiring inordinate outlays of money, energy, or time by the adopting person or group are likely to move slowly.
2. Technological Factors--technological innovations are relatively easy to adopt.
3. Associated Materials--materials aid the diffusion of educational innovations very considerably.
4. Implementation Supports--innovations with built-in implementation supports should diffuse more rapidly than those not so supported.
5. Innovation/system Congruence--some innovations bear characteristics which do not necessarily serve to slow adoption rates in themselves, but do retard diffusibility because of their incongruence with a potentially accepting system.[78]

Personalities of Group Members as Factors in Change

The characteristics of any group is strongly conditioned by the personalities of its members. Bales has indicated that:

> Measured personality traits of members involving emotional maturity, friendly cooperativeness, trustfulness and adaptability, adventureousness, willed application and freedom from anxiety tend to be positively related to smooth and effective group functioning.[79]

The personality of an individual is defined as the "total psychological and social reactions of an individual; the synthesis of his subjective, emotional, and mental life, his behavior, and his reactions to the environment."[80] The motives of people are learned and represent things they accept or reject.

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[78] Matthew B. Miles, Innovation in Education, (New York: Bureau of Publications, Teachers College, Columbia University, 1964) pp. 635-639.

[79] Bales and others, pp. 411-416.

[80] Good, p. 392.

Since acceptances are shared social experiences, they are drawn from and contribute to the store of shared experiences termed "culture". Individuals use this store of shared experiences in learning.

> What and how to see (the cognitive dimension of motivation), what and how to judge (the normative or evaluative dimensions of motivation), what and how to feel (the emotional dimensions of motivation).[81]

Considering the definition for "personality", group members involved in processes of change will exhibit characteristic behavior patterns of acceptance. The interacting personalities present in the group add to the pertinence of the following statements:

1. The culture of a people shapes the frames and strategies of their acceptances.
2. Change facilitation involves processes of both individual and collective acceptance.
3. Change facilitation is almost always phrased and realized in and through the existing or emerging institutional setting of a society.[82]

Group Membership as an Influence in Change

Early research by Coch and French in industrial relations indicated that group resistance to change could be overcome by the use of group meetings in which management effectively communicated the need for change and stimulated group participation in planning the changes.[83] The work of Lewin revealed group process as an effective means of promoting changes in individuals' food habits.[84] Levine and Butler clearly indicate the force behind individuals' behavior changes resulting from group decision making. They stated that:

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[81] Paul Meadows, Novelty and Acceptors: A Sociological Consideration of the Acceptance of Change. A report to the Symposium on Identifying Techniques and Principles for Gaining Acceptance of Research Results of Use of New Media in Education, Lincoln, Nebraska, November 24-27, 1963, (Lincoln: The University of Nebraska, 1963) pp. 40-68.

[82] Meadows, pp. 50-51.

[83] Lester Coch and John R. P. French, "Overcoming Resistance to Change," Human Relations, 1, 1948, p. 531.

> The findings also indicate that once a group arrives at a decision to act, the members, even though they may act as individuals, take on that decision and act in accordance with it. The force of this group decision was evidently sufficient to overcome the resistance to change in habitual ways of thinking and acting.[85]

The influence of group membership on an individual's perception has been reported by both Bovard and Sherif. Bovard indicated that group-centered structure has more power to alter the perceptions of individuals in the direction of a common norm than leader-centered group structure.[86] Sherif found that when several individuals give their judgments in the presence of each other the whole group establishes a range and point of reference peculiar to the group.[87]

The value of group membership to an individual group member was indicated by the findings of Kelley and Volkart. They found that arguments and communications for group change made under public conditions heightened the group's resistance to change and that the influence on individual group members was inversely related to how highly they valued their membership in the group.[88]

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[84] Kurt Lewin, "Forces Behind Food Habits and Methods of Change," The Problem of Changing Food Habits, Bulletin of National Research Council, No. 108, The Council, 1943, pp. 35-63.

[85] Jacob Levine and John Butler, "Lecture vs. Group Decision in Changing Behavior," Journal of Applied Psychology, 36, 1953, p. 32.

[86] Everett W. Bovard, "Group Structure and Perception," Journal of Abnormal Psychology, 46, 1951, pp. 398-405.

[87] Muzafer Sherif, "A Study of Some Social Factors in Perception," Archives of Psychology, 187, 1935, pp. 5-60.

Stock and Thelen have indicated that to understand individual change in group situations necessitates consideration of the concepts, "individual valency" and "group culture". Individual valency was characterized as having three related aspects: affective approach, culture preference, and area concern. An individual's affective approach is related to the overt behavior exhibited by an individual in response to generalized group cultures. The cultural preference of an individual indicates the preferred realms of activity in group situations. An individual's area of concern refers to those areas to which the individual reacts in the group situation.

The group culture was presented an an environmental medium in which individual change takes place. As individuals change, the patterns of interaction within the group shift and cause the emotional atmosphere within the working situation to vary accordingly. Not every individual within a group will experience the same responses in a given environment. The relative clarity or confusion experienced in the environment will determine how much individuals learn in a given group situation. A wide variety of experiences was found to be more helpful in producing individual changes than situations featuring only a limited number of experiences.

The following three postulates were presented as pertinent to an understanding of individual change in group situations:

1. Individual change will be accompanied by shifts in valency pattern.

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[88] H. H. Kelley and E. H. Volkart, "The Resistance to Change of Group-Anchored Attitudes," American Sociological Review, 17, 1952, p. 464.

2. The group culture can be seen as the context within which change takes place.
3. The nature of change is determined by the particular interaction between the individual's valency characteristics and the nature of the group culture.[89]

An individual's desire for membership in a group was shown by Deutsch to be affected by the past experience of success or failure of the group and the perceived attitudes of other group members.[90] Raven has reported that group cohesiveness is the resultant of all the forces operating on individuals which persuade them to remain in the group.[91] Jackson and Saltzstein revealed conforming forces present in person-group relationships in the areas of social reality and group locomotion.[92]

Social reality was described as a person's need to depend upon information provided directly or indirectly by others. This need has its source in an individual's desire to make an appropriate response or gain an accurate perception of a phenomenon. Group locomotion forces derive from pressures toward group uniformity. These forces are exerted on all group members especially those blocking group progress toward a common goal.[93]

When a group attempts to use coercion to force a member to follow the group, Horwitz found that individuals will experience persistent tension, but if no coercion is used the individual's tension will reduce. It was also revealed that in a situation of relatively strong coercion tension a temporary interruption in the group's work would reduce coercion tension.[94]

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[89] Dorothy Stock and Herbert A. Thelen, Emotional Dynamics and Group Culture, (New York: New York University Press, 1958) pp. 145-149.

[90] Morton Deutsch, "Some Factors Affecting Membership Motivation and Achievement Motivation in a Group," Human Relations, 12, 1959, pp. 81-95.

[91] Bertram H. Raven, "The Dynamics of Groups," Review of Educational Research, 29, 1959, pp. 332-343.

[92] Jay M. Jackson and Herbert D. Saltzstein, "The Effects of Person-Group Relationships on Conformity Processes," The Journal of Abnormal and Social Psychology, 57, 1958, pp. 17-24.

[93] Ibid.

Group Cooperation--An Essential Element in Process of Change

Groups which interact cooperatively in an effort to gain common goals experience greater productivity. Study groups which are task-oriented have been shown to produce greater personality and behavior change than free discussion groups.[95] Banghart has shown cooperative groups experience more anxiety with difficult problems than non-cooperative groups. This anxiety was reported as more influential in terms of increased efficiency exhibited by the cooperative group.[96] When members of a group are forced to compete for mutual exclusive goals, group harmony and effectiveness are disrupted. Deutsch found that individuals working together as a cooperative group exhibited superior communication of ideas, coordination of efforts, and friendliness and pride in one's group.[97]

Thomas has reported the significant responses of individual group members to increasing levels of facilitation among persons in interdependent roles. Group members indicated that they experienced:

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[94] Murry Horwitz, "The Recall of Interrupted Group Tasks: An Experimental Study of Individual Motivation in Relation to Group Goals," Human Relations, 7, 1954, pp. 3-38.

[95] John H. Mann and Carola H. Mann, "The Importance of a Group Task in Producing Group-Member Personality and Behavior Changes," Human Relations, 12, 1959, pp. 75-80.

[96] Frank W. Banghart, "Group Structure, Anxiety and Problem-Solving Efficiency," Journal of Experimental Education, 38, 1959, pp. 171-174.

[97] Morton Deutsch, "An Experimental Study of the Effects of Cooperation and Competition Upon Group Process," Human Relations, 2, 1949, pp. 199-231.

1. Stronger responsibility forces.
2. Greater speed of locomotion toward the goal.
3. Greater emotional tension arising from restraining forces generated by approaching the limits of ability and by fatigue created by the speed of locomotion.
4. Greater group cohesiveness.[98]

An individual's understanding of common group goals and an understanding of the relations which exist between an individual's effort and the group's effort to attain these goals contributes to the productivity of the individual. Raven and Rietsema have revealed the need for clarity in understanding the group situation by individuals actively involved in interdependent relationships with a goal-directed group. The greater the clarity of the group situation:

1. The more will the individual be attracted to the group goal-related task.
2. The less non-task-directed tension will be experienced by the individual.
3. The less hostile feelings will be experienced by the individual.
4. The higher will be the individual's self-evaluation.
5. The greater the group-belongingness of the individual.
6. The more favorable will be the evaluation given by the individual to his group.
7. The more will the individual be able to perceive social differentiation in the group.
8. The more will the group be able to influence the individual.[99]

Collaboration is revealed as the necessary plan of interaction for human forces involved in processes of change. A systems approach necessitates a functional team type of organization. The shared responsibilities for project success must be based on a firm committment to group interaction processes. Thiabaut has revealed that:

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[98] Edwin J. Thomas, "Effects of Facilitative Role Inter-dependence on Group Functioning," Human Relations, 10, 1957, pp. 347-366.

[99] Bertram H. Raven and Jan Rietsems, "The Effects of the Varied Clarity of Group Goal and Group Path Upon the Individual and His Relation to His Group," Human Relations, 10, 1957, pp. 29-45.

> Inter-team hostilities develop where two teams are forced to interact on a basis of unequal status and that these hostilities significantly affect the attractiveness of sharing membership with others.[100]

Hilgard stressed the need for collaboration between learning theory psychologists and educational practitioners. He felt that:

> Collaboration must be on long-range investigations, in which the search is conducted together. We do not know the best specifications for team research, but a variety of skill and experiences have to be brought together among people who understand each other as they face a common task.[101]

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[100] John Thiabaut, "An Experimental Study of the Cohesiveness of Under-Privileged Groups," Human Relations, 3, 1950, p. 277.

[101] Earnest R. Hilgard, "A Perspective on the Relationship Between Learning Theory and Educational Practice," Theories of Learning and Instruction, Sixty-third Yearbook of the National Society for the Study of Education, Part I, (Chicago: The Society, 1964) p. 404.

VI. A MODEL OF THE TIME-INVOLVEMENT DIMENSIONS FOR INNOVATION IN EDUCATIONAL PRACTICE[102]

Components of the Model

A model of the time-involvement dimensions for innovation in educational practice includes the following aspects: (1) a research-implementation strategy, (2) reactions to innovation, (3) stages in the adoption process, and (4) functions of research. Educational practice should be founded upon and reflect the knowledge derived from research. Research findings slowly filter into educational practice through uncharted pathways of communication. The model presented may be used to reveal alternative pathways and communication networks which may be utilized to drastically reduce the time lag currently being experienced in educational diffusion.

The modular design must account for those factors which are known to be involved in the adoption and diffusion of innovations in a social system.[103] Thus, the model must encompass: (1) the steps required for research findings to pass into educational practice along a research-implementation continuum; (2) the behavioral reactions of people to innovations which are influenced by their perceptions of identities, roles, situations, task-achievements, needs-satisfactions, social system norms and the total ecology of the system; and (3) the stages in the adoption process by which individuals reach final decisions for adoption, or rejection, of innovations.

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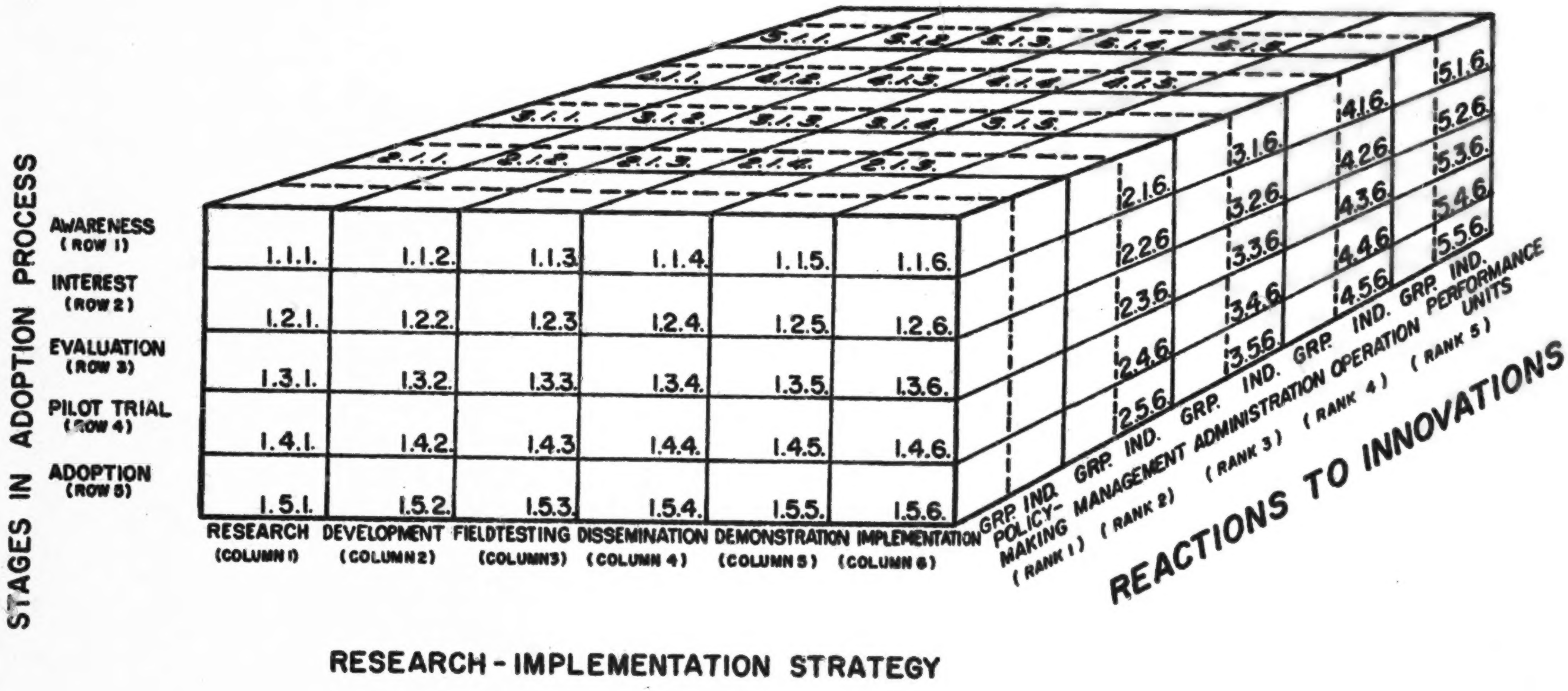
[102] Figure 4 reveals a model that was developed in collaboration with Donald W. Johnson and Frederick F. McDonald.

[103] Everett M. Rogers, Diffusion of Innovations, (New York: The Free Press of Glencoe, 1962) p. 12.

FIGURE 4

A Model of the Time-Involvement Dimensions for Innovation in Educational Practice



DESIGNED BY :
DONALD R. MILLER
DONALD W. JOHNSON

A Research-Implementation Strategy:

Six steps in research on learning have been presented by Hilgard in a model of the existing continuum between pure research and technological research and development.[104] The following outline reveals these steps and their relevance to learning:

A. Pure Science Research in Learning

- Step 1 Research on learning with no regard for its educational relevance, e.g., animal studies, physiological, bio-chemical investigations...
- Step 2 Research on learning which is not concerned with educational practices but which is more relevant than that of Step 1 because it deals with human subjects and with content that is nearer to that taught in school, e.g., nonsense syllable memorization and retention.
- Step 3 Research on learning that is relevant because the subjects are school-age children and the material learned is school subject matter or skill, though no attention is paid to the problem of adapting the learning to school practices, e.g., foreign language vocabulary learned by paired-associate method with various lengths of list and with various spacing of trials.

B. Technological Research and Development

- Step 4 Research conducted in special laboratory classrooms, with selected teachers, e.g., bringing a few students into a room to see whether or not instruction in set theory or symbolic logic is feasible, granted a highly skilled teacher.
- Step 5 A tryout of the results of prior research in a "normal" classroom with a typical teacher. Whatever is found feasible in Step 4 has to be tried out in the more typical classroom, which has limited time for the new method, and may lack the special motivation on the part of either teacher or pupil.
- Step 6 Developmental steps related to advocacy and adoption. Anything found to work in Steps 4 and 5 has to be packaged for wider use, and then go through the processes by which new methods or procedures are adopted by those not party to the experimentation.[105]

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[104] Ernest R. Hilgard, "A Perspective on the Relationship Between Learning Theory and Educational Practices," Theories of Learning and Instruction, Sixty-third Yearbook of the National Society for the Study of Education, Part I, (Chicago: The Society, 1964) pp. 405-411.

[105] Ibid.

Clark has presented a rationale which reveals a five-step continuum extending from research to implementation. The steps include: (1) research, (2) development, (3) dissemination, (4) demonstration, and (5) implementation.[106] Brickell prefers a four-phased rationale when implementation is designed to improve educational programs. The phases include: (1) basic research, (2) program design, (3) evaluation through field testing, and (4) dissemination through demonstration and re-education.[107] This rationale is based upon the following logical tenets:

> 1. Basic research in instruction attempts to answer the question "How do people learn?" It is the study of the circumstances, processes and effects of human learning...
> 2. Program design attempts to answer the question, "How should people be taught?" It is the translation of what is known about learning into programs for teaching...
> 3. Program evaluation tries to answer the question, "Does the program teach?" It involves the systemic testing of a new instructional approach to find what it will accomplish under what conditions...
> 4. Program dissemination is the process of spreading innovations into schools... The ideal circumstances for the demonstration of a new approach are those which are ordinary, unenriched, and normal... After a school has decided to adopt an innovation, the staff must be taught to carry it out.[108]

The model of the time-involvement dimensions for innovation in education practice (See Figure 4) features a six-step continuum from research to implementation. The steps include: (1) research, (2) development, (3) field testing, (4) dissemination, (5) demonstration, and (6) implementation. Since field testing is frequently associated with the developmental stages of research design, the inclusion of this step may be considered somewhat redundant until it is related to the other aspects of the model.

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[106] Interview with Donald W. Johnson, California State Department of Education, July 22, 1965.

[107] Henry M. Brickell, State Organization for Educational Means. A Report to the Symposium on Identifying Techniques and Principles and Gaining Acceptance of Research Results of Use of Newer Media in Education, Lincoln, Nebraska, November 24-27, 1963 (Lincoln: The University of Nebraska, 1963), pp. 198-201.

[108] Ibid.

Reactions to Innovations:

Three broadly conceived processes of cultural change are innovation, diffusion and integration. An innovation is perceived as the establishment of a new element or a combination of elements. Diffusion is the process whereby the innovation comes to be shared. Finally, the innovation becomes mutually adjusted to other elements in the culture through an integration process.[109] The introduction of an innovation into the cultural setting stimulates decision-making processes (adoption-rejection) which are influenced by many variable factors.

One explanation reveals acceptance and/or non-acceptance of change as functions of several large classes of variables. These functional variables include:

1. The proven quality of the innovation.
2. Available information about the innovation and the source of the information.
3. The nature of the relationship between the induced source of change and the persons who are being helped to change with special attention to the 'power" relationships of the two.
4. The attitudes, cognitions, self-perceptions, of the persons.

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[109] Art Gallaher, The Role of Advocate in Directed Change. A Report to the Symposium on Identifying Techniques and Principles and Gaining Acceptance of Research Results of Use of Newer Media in Education, Lincoln, Nebraska, November 24-27, 1963, (Lincoln: The University of Nebraska, 1963) p. 21.

5. The personal, interpersonal and organizational relationships of the person and his significant others.[110]

The behavior of educators in planned processes of change is influenced by individuals' perceptions of identities, roles, situations, task-achievements, needs-satisfactions, social system norms and the total ecology of the environment. The behavior of individuals depends upon the qualities of the interaction present in the change environment. Figure 5 depicts a model of the behavioral influences experienced by educators in a school's social system. The time-involvement dimensions model reveals that individuals at every level of school system organization react to innovations. In this regard the two models complement one another.

The model of the time-involvement dimensions for innovation in educational practice utilizes "reactions to innovation" as a depth dimension. The true depth becomes apparent when one considers that changes in individuals located at different levels of organization cannot be effected with equal ease. Changes require more effort as one proceeds from one level of organization to another and from one level of change responsibility to another. However, once changed most individuals will influence a series of individual changes. Individuals located at the policy-making, management and administrative levels of organization can accomplish this easily by utilizing the power structure available to them. The factors involved in organizational change are therefore considered to be of prime importance in diffusion process studies. In addition, task force and other collaborative efforts involving representatives of differ-

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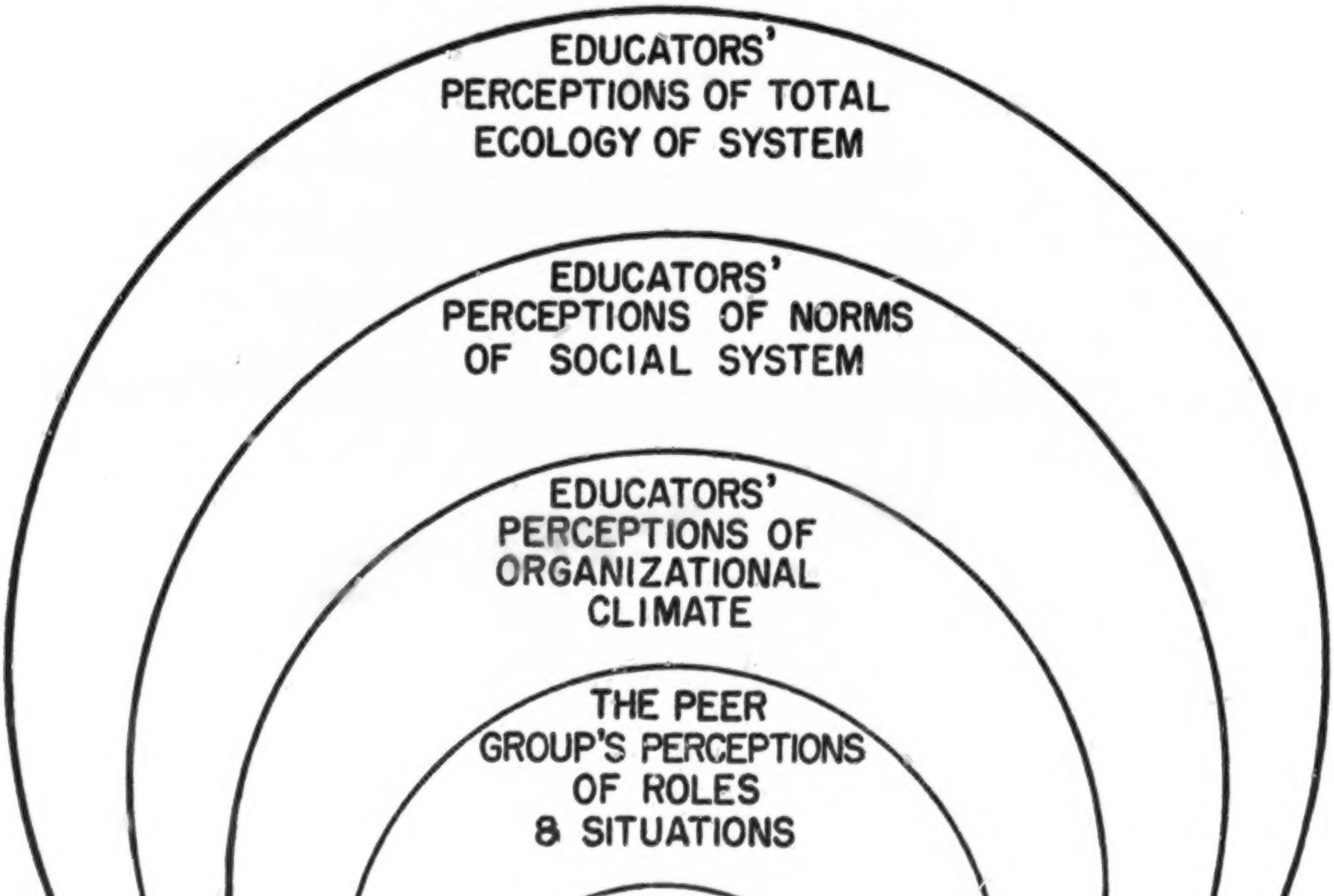
[110] Robert Chin, Models and Ideas About Changing. A Report to the Symposium on Identifying Techniques and Principles and Gaining Acceptance of Research Results of Use of Newer Media in Education, Lincoln Nebraska, November 24-27, 1963, (Lincoln: The University of Nebraska, 1963) pp. 3-5.

FIGURE 5

DOMAINS OF BEHAVIORAL INFLUENCE IN SCHOOL ORGANIZATION

THE BEHAVIOR OF EDUCATORS IS INFLUENCED BY INDIVIDUALS' PERCEPTIONS OF IDENTITIES, ROLES, SITUATIONS, TASK-ACHIEVEMENTS, NEEDS-SATISFACTIONS SOCIAL SYSTEM NORMS AND TOTAL ECOLOGY.


EDUCATORS' PERCEPTIONS OF TOTAL ECOLOGY OF SYSTEM
EDUCATORS' PERCEPTIONS OF NORMS OF SOCIAL SYSTEM
EDUCATORS' PERCEPTIONS OF ORGANIZATIONAL CLIMATE
THE PEER GROUP'S PERCEPTIONS OF ROLES & SITUATIONS
THE EDUCATOR'S PERCEPTIONS OF ROLE AND SITUATION
THE EDUCATOR'S IDENTITY

[ADAPTED FROM RICHARD C. LONSDALE, "MAINTAINING THE ORGANIZATION IN DYNAMIC EQUILIBRIUM," IN BEHAVIORAL SCIENCE AND EDUCATIONAL ADMINISTRATION. EDITED BY DANIEL E. GRIFFITHS. (CHICAGO: NATIONAL SOCIETY FOR THE STUDY OF EDUCATION, 1964.), P. 143.]

ent levels of organization should also serve to reveal other change-inducing mechanisms.

Stages in the Adoption Process:

A model of the adoption of an innovation by an individual, as shown in Figure 6, "contains three major divisions: (1) antecedents, (2) process, and (3) results."[111] Antecedents to adoption include the factors of an educator's identity and his perceptions of the situational field in which innovations are introduced. The stages of the adoption process are: "(1) awareness, (2) interest, (3) evaluation, (4) trial and (5) adoption."[112] The results of adoption will be in the form of a decision to: "(1) adopt and continue the use of the innovation; (2) adopt but for some reason decide later to discontinue the use of the innovation; (3) initially reject the innovation but later adopt and continue to use it, and (4) continuously reject the innovation."[113]

The time-involvement dimensions model (Figure 4) features one minor modification in the stages of adoption. The term "pilot trial" will be used for the trial stage because the model features trial stages in both the research-implementation strategy and the stages of adoption. "Pilot trial" is reserved for use when one is involved in the first trial efforts related to adoption. The term "field test" is reserved for use when reference is being made to the testing of a carefully planned research design under controlled conditions.

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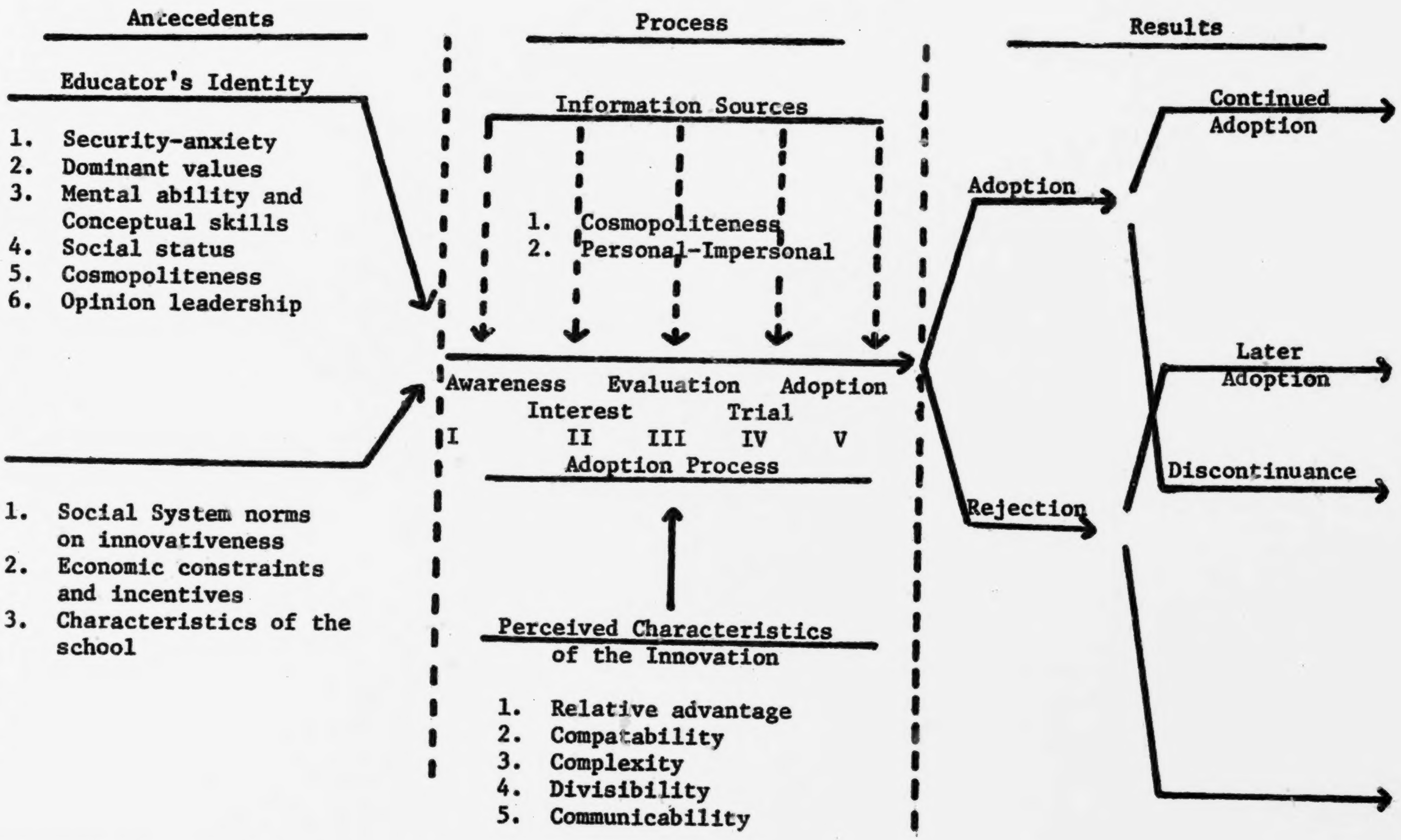
[111] Rogers, pp. 305-307.

[112] Ibid., pp. 81-86.

[113] Ibid., pp. 305-307.

FIGURE 6

A MODEL OF THE ADOPTION OF AN INNOVATION BY AN INDIVIDUAL WITHIN A SOCIAL SYSTEM*



*Adapted from Everett M. Rogers, Diffusion of Innovations, (New York: The Free Press of Glencoe, 1962) p. 306

The stages in adoption are components of a decision-making process. The awareness stage is marked by the possession of knowledge of an innovation. An individual's awareness of an innovation stimulates interest and subsequently, the collection of more information. The individual relates this information to the conditions perceived to be present in the situational field during the evaluation stage. If the evaluation is positive, then the individual may decide to engage in a pilot trial of the innovation. The results of this trial usually prompts the individual to reject or adopt the innovation.

The Functions of Research:

Three functions for research have been cited as: (1) the legitimating function, (2) the delineation function, and (3) the monitoring function.[114] An innovation prompts decision-making processes which may result in change, no change, or retained change. Research has a legitimation function since it signifies authoritative approval of innovations. Research provides a framework for thinking about innovations by "delineating the variables and the complexity of their interactions."[115] All research on educational innovations "dealing with outcomes and conducted in the context of an operating educational situation performs a monitoring function."[116]

A model of the time-involvement dimensions of innovation in educational practice when utilized can provide objective data concerning the value of innovations being implemented. The model can also be used to study the nature of innovation, diffusion and integration processes. Further, the model will enable the identification of strategic organizational variables and determine the extent and complexity of their interaction. In addition, the model can be utilized as an organizational guide to maximize the advantages of the monitoring, legitimizing and delineating functions of research in the planned diffusion of educational innovations. Thus, the functions of research represent necessary components of the time-involvement dimensions model being developed.

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[114] Charles F. Hoban, Dial "T" for Tryst. A Report to the Sumposium on Identifying Techniques and Principles and Gaining Acceptance of Research Results of Use of Newer Media in Education, Lincoln, Nebraska, November 24-27, 1963, (Lincoln: The University of Nebraska, 1963) pp. 267-275.

[115] Ibid.

[116] Ibid.

The monitoring function of educational research should provide educational practitioners with evidence for use in evaluation of innovations. This function may prove to be one of the most vital aspects of individual and group adoption decisions. Further, the evidence gained during monitoring activities should provide many topics for group discussion and interaction. Visitation programs at research and school facilities will also contribute to the effectiveness of the monitoring function of educational research in diffusion.

Thus, the functions of research were considered to be vital factors for consideration in the design of the time-involvement dimensions model. These functions serve by providing influencing evidence for use in developing programs of planned change. Knowledge from research would also serve to reinforce communication linkages because it increases the acknowledged credibility of the sender and encourages feedback from the receiver. Collaboration would thus be stimulated and the quality of communication responsitivity would thereby be enhanced.

VII. CONSTRUCTS UTILIZED IN THE MODEL

The model of the time-involvement dimensions for innovation in educational practice features a block or unit-type matrix having length, height, and depth dimensions. The length of the model represents one time and involvement dimension--a research to implementation strategy. This dimension contains the individual steps: (1) research, (2) development, (3) field testing, (4) dissemination, (5) demonstration, and (6) implementation. The height of the model represents another time and involvement dimension--the five stages in the adoption process. The stages of adoption include: (1) awareness, (2) interest, (3) evaluation, (4) pilot trial, and (5) adoption. The model's depth depicts (1) policy making, (2) management, (3) administration, (4) operations and (5) performance units reactions to innovations; thus, it also represents another time and involvement dimension.

Therefore, the model consists of individual block matrices each of which possess three time and involvement dimensions. Using the model, it may be possible to identify and define the behavior of individuals who are engaged in processes of planned change. An understanding of such behavior is a logical prequisite for the implementation of innovations in educational practice. The model may also be used to identify and define the relationships and interactions which exist between and among the functional and organizational elements of an educational system. Opinion and research seem to justify the arrangement depicted in the model. Use of the model may establish the validity of this arrangement and provide critical insight relative to the perceived degrees of difficulty encountered when changes are effected in different levels of organization.

The policy-making level is perceived as being the level of organization at which it is most difficult to effect changes; yet, once changed, it is the level of organization which can influence the greatest number of individual changes. Managers and administrators are usually more resistant to change than are individuals located at the operations or performance units level; yet, once changed, they possess power which can be employed to influence other individual changes.

The pertinent factors involved in processes of change at each level of organization in education must be identified and defined before programs of planned change can be established. The behavior patterns of individuals located at each level of organization, as reflected by their demonstrated reactions to innovations, must be investigated and recorded.

The model may be used to study and interpret the implementation causeways experienced by innovations as they pass into educational practice. The consequences produced by such innovations can be related to processes of change and subsequent rates of diffusion for each innovation. The model can be used to trace an individual's effort in implementation. All individuals engaged in the decision-making process of adoption of innovations require information from credible sources. The model can be used to study the flows of information which have occured when an innovation was implemented into educational practice. In addition, the model may facilitate the study of informational requirements and information handling procedures which support the diffusion of educational innovations and their adoption into practice.

The strength of an innovation's support is determined in a crucial "real-world" test of its effectiveness. The test results, as perceived by educational practioners, will determine the amount of force an innovation can generate to extend its adoption influence. To insure maximum results from such influence, the communication network linkages and the communication media utilized must facilitate the transmission of an impact of complete understanding to the receiver. Communication and collaboration are identified as crucial factors in any program involving the implementation of innovations in educational practice. The time-involvement dimensions model should prove to be a useful tool in efforts to identify and define critical factors in implementation processes.

The Use of the Model in Studying Causeways for Implementation

The model clearly indicates that innovations in educational practice possess time and involvement dimensions. Since innovations may be introduced by individuals from any level of organization, the rate of diffusion for an individual innovation will be determined, in part, by the degree of facilitation exhibited by each level of organization. The nature of the established communication network between the levels of organization will also affect the rate of diffusion of an innovation. The consequences of adoption will influence behavior in subsequent implementation attempts. Finally, the nature of the innovation will contribute to its tested effectiveness and its subsequent adoption or rejection.

The ranks of the model can be separated to study causeways for implementation. Each unit of the model can be isolated in an effort to study the behavior of individuals engaged in processes of adoption and implementation. The units of the model are identifiable using their rank, row and column numbers in that order. Thus policy-making behavior in evaluations of disseminated information is coded 1.3.4., while similar behavior by management and administration is coded 3.3.4., respectively.

Five causeways have been identified and will be discussed under the headings: (1) a traditional causeway, (2) an experimental causeway, (3) a modified-traditional causeway, (4) the "new curricula" causeway, and (5) a post facto causeway.

A Traditional Causeway for Implementation of Innovations in Educational Practice

Traditionally, the results of pure research are published in professional journals where such knowledge may repose several years without any noticeable affect on educational practice. Individual research scientists become aware of needed research (5.1.1.), develop an interest in the area (5.2.1.) and create research designs for evaluations (5.3.2.). A pilot trial is usually engaged in to develop reliable field testing models (5.4.2.). These models are used in field testing activities which may involve "borrowed" classes of students or paid subjects (5.4.3.). The results of such field testing activities are published in professional journals (5.4.4.) and may only be adopted as disseminated knowledge by a small body of innovatively-oriented educational practitioners (5.5.4.).

Individually, or in cooperation with research scientists if proximity permits, these educational practitioners develop educational sequences and models based upon the research results. These sequences and models are then used in pilot trials which demonstrate the efficacy of the innovation in the classroom situation (5.4.5.). Individual reactions to the trial results achieved through pilot trial may cause adaptations in the innovation and adjustments in individual behavior. (Figures 5 and 6 reveal the dimensions of behavior affecting diffusion.) Subsequent adoption of the innovation and its implementation into educational practice may result (5.5.6.).

This mode of adoption and implementation is restricted to the following areas when administrative initiative is lacking: (1) "change in classroom practice..., (2) relocation of existing curriculum content..., and (3) introduction of single special courses at the high-school level..."[117] This is not to suggest that individuals do not attempt to influence administrative and management reactions to innovations. Their influence actually slowly penetrates the other levels of organization contributing to the final diffusion pattern characterizing the implementation of innovations.

The traditional causeway also features other elements of reaction relative to administrative and management involvement. Traditionally, educational change has been the function of curriculum committees staffed largely by teachers working under the direction of a curriculum consultant or administrator. Johnson has reported that such change processes involve the following steps:

> 1. The evaluation of an existing program with the use of standardized achievement tests identifies specific content or skills which students are not mastering.
> 2. Research literature is reviewed to determine if more effective methods should be used to teach students the needed content and skills.
> 3. A revised course of study and teachers guides are developed, incorporating the modifications suggested by research.
> 4. Additional equipment and materials needed for these modified instructional techniques are required.
> 5. In-service training meetings are conducted by administrative and supervisory staff in the use of new equipment.
> 6. The new program is introduced to the classrooms.[118]

Based upon this evidence, the traditional causeway also involves a linkage between management evaluation of implemented programs (2.3.6.) and evaluation of disseminated research knowledge (2.3.4.) in efforts to effect changes in educational practices. During the evaluation stages some administrative and individual reactions would also be involved but emphasis is considered as managerial. An evaluation of disseminated research knowledge (2.3.4.) prompts pilot-trial demonstrations (2.4.5.), the results of which influence organizational decisions for adoption and implementation (1.5.6.). An in-service training program is used to demonstrate the adopted innovation to administrators and individuals (3.4.5., 4.4.5. and 5.4.5. respectively) so that complete implementation might be effected (3.5.6., 4.5.6. and 5.5.6.). Figure 7 reveals the time-involvement dimensions of the traditional causeway for implementation of innovations in educational practice.

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[117] Brickell, pp. 201-206.

[118] Donald W. Johnson, "Title III and the Dynamics of Educational Change in California Schools," Innovation in Education, Matthew B. Miles (ed.), (New York: Bureau of Publications, Teachers College, Columbia University, 1964) pp. 157-182.

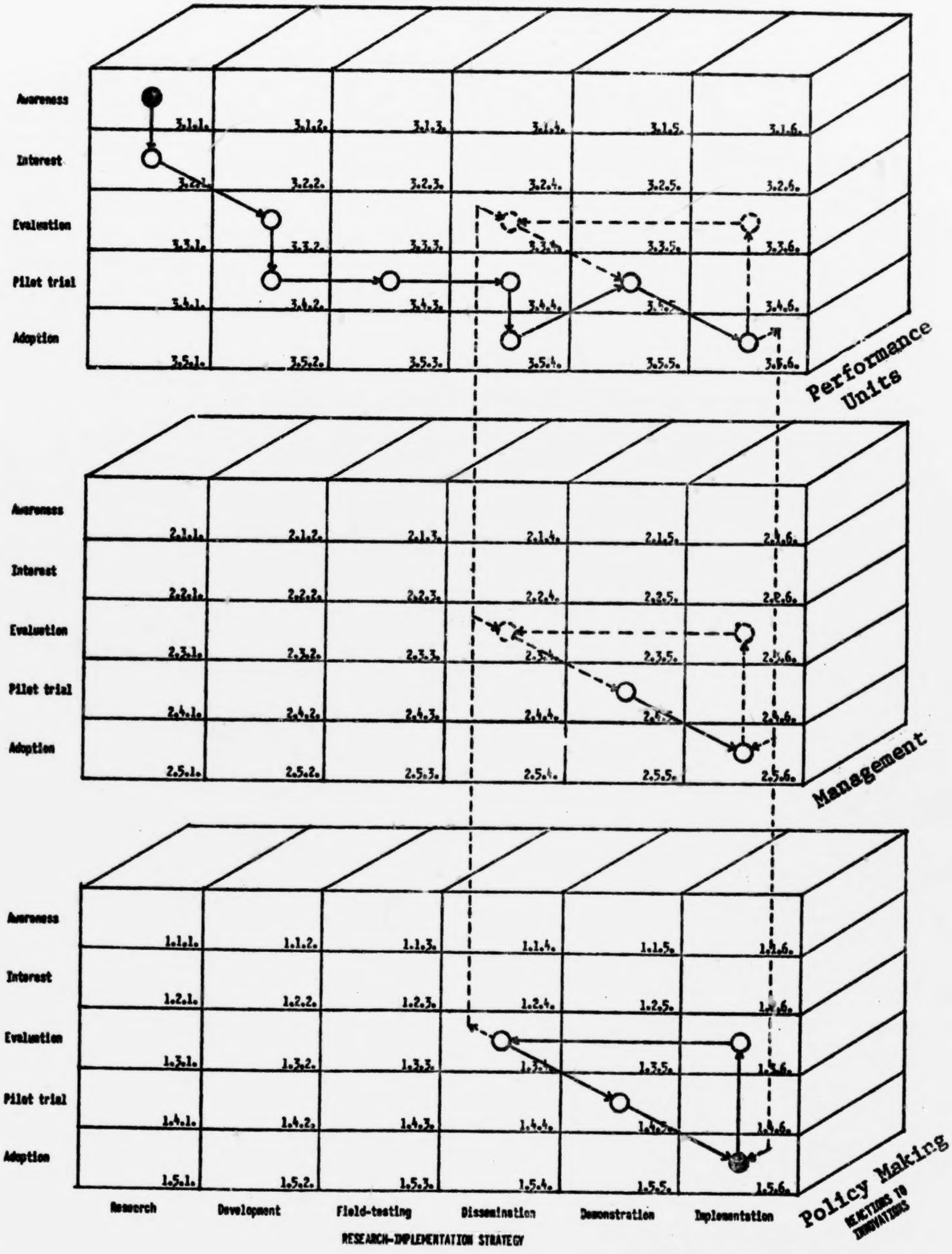
A detailed study of the patterns of interaction and the reactions of individuals present in the traditional causeway should reveal many factors and implications to designers of programs of planned change. Further studies should serve to point out existing patterns of behavior which have developed in the traditional causeway and indicate new avenues of exploration for implementation of innovations in educational practice.

An Experimental Causeway for Implementation of Innovations in Educational Practice

Programs of planned change could use the time-involvement dimensions model to facilitate the implementation of carefully chosen innovations. A task force or an implementation team, could carefully evaluate promising innovations reported in research literature. Thereafter, a strategy for implementation could be planned for each innovation depending upon its unique characteristics. Then, the experimental causeway for implementation of innovations

FIGURE 7

A Traditional Causeway for Implementation of Innovations in Educational Practice



could be utilized to involve a complete school organization.

The task force would prepare a complete written description of the innovation citing advantages which might be anticipated if the innovation is adopted. The curricular or administrative specialists would prepare demonstrations of the innovation relating its application in practice. A pilot trial environment could be provided to facilitate individual pilot trials and group demonstrations of the innovation.

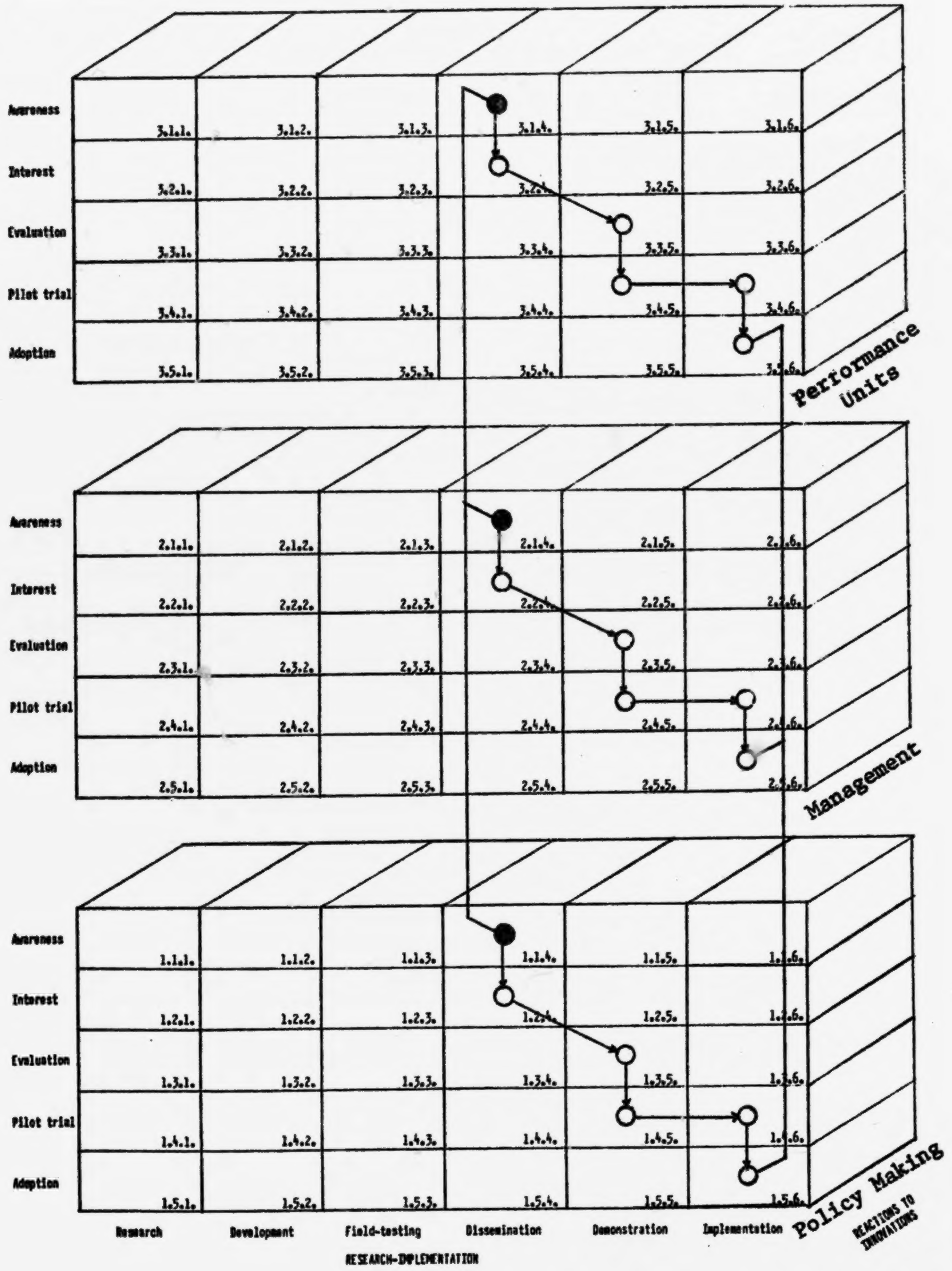
The strategy involves the following steps which can be traced on the model as indicated in Figure 8:

1. The complete organization would be made aware of the innovation and its advantages using descriptive literature and demonstrations (1.1.4., 2.1.4., 3.1.4., 4.1.4., 5.1.4.)
2. The description and demonstration of the innovation should create and facilitate organization-wide interest (1.2.4., 2.2.4., 3.2.4., 4.2.4., 5.2.4.)
3. The demonstrations presented should provide the information required for evaluation by all levels of organization (1.3.5., 2.3.5., 3.3.5., 4.3.5., 5.3.5.)
4. Individuals would engage in pilot trials, patterned after the demonstrations, to test the innovation with small groups of children in a protective atmosphere. (1.4.5., 2.4.5., 3.4.5., 4.4.5., 5.4.5.) The results of these pilot trials would be diffused throughout the various levels of organization by group interaction.
5. Individuals would develop pilot trials for use in classrooms with entire classes of children. (1.4.6., 2.4.6., 3.4.6., 4.4.6., 5.4.6.) The results of these trials are crucial in the implementation strategy and, therefore, supervisory help must be provided teachers developing pilot trials for classroom application.
6. A series of successful classroom trials would lead to the full adoption and implementation of the innovation in educational practice (1.5.6., 2.5.6., 3.5.6., 4.5.6., 5.5.6.). Reinforcement would be provided by qualified experts and supervisory personnel in an effort to synthesize and incorporate the innovation within the instructional program of the school.

The nature of the innovation and the planned comprehensiveness of introduction may necessitate the use of an in-service training program to facilitate implementation. Teaching aides might prove to be especially helpful

FIGURE 8

An Experimental Causeway for Implementation of Innovations in Educational Practice



as they could assist teachers actively engaged in pilot trials. Demonstrations must be prepared which depict the success of the innovation in classroom settings with students and teachers. These could be presented in other schools to influence adoption.

A Modified-Traditional Causeway for Implementation of Innovations in Educational Practice

A modified-traditional causeway for implementation of innovation in educational practice may prove advantageous for research scientists associated with educational practioners. This causeway parallels the traditional causeway in part as shown in Figure 7. The research scientist develops an awareness of research needs (5.1.1.), becomes interested in the area (5.2.1.), and creates a research design for evaluation (5.3.2.).

A pilot trial can be initiated in a field testing environment involving curricular specialists or skilled teachers with small groups of students (5.4.3.). Influence would spread to 4.4.3., 3.4.3., 2.4.3. and 1.4.3., because of the active involvement in research at the school site. The results of this pilot trial in the field testing environment can be appraised, modified and disseminated for evaluation by representatives of the school organization as well as by those actively involved (5.3.4., 4.3.4., 3.3.4., 2.3.4., 1.3.4.). Demonstration programs could be prepared and used in other schools. In addition, other school personnel can engage in similar pilot trials patterned after the model program (5.4.5., 4.4.5., 3.4.5., 2.4.5., 1.4.5.).

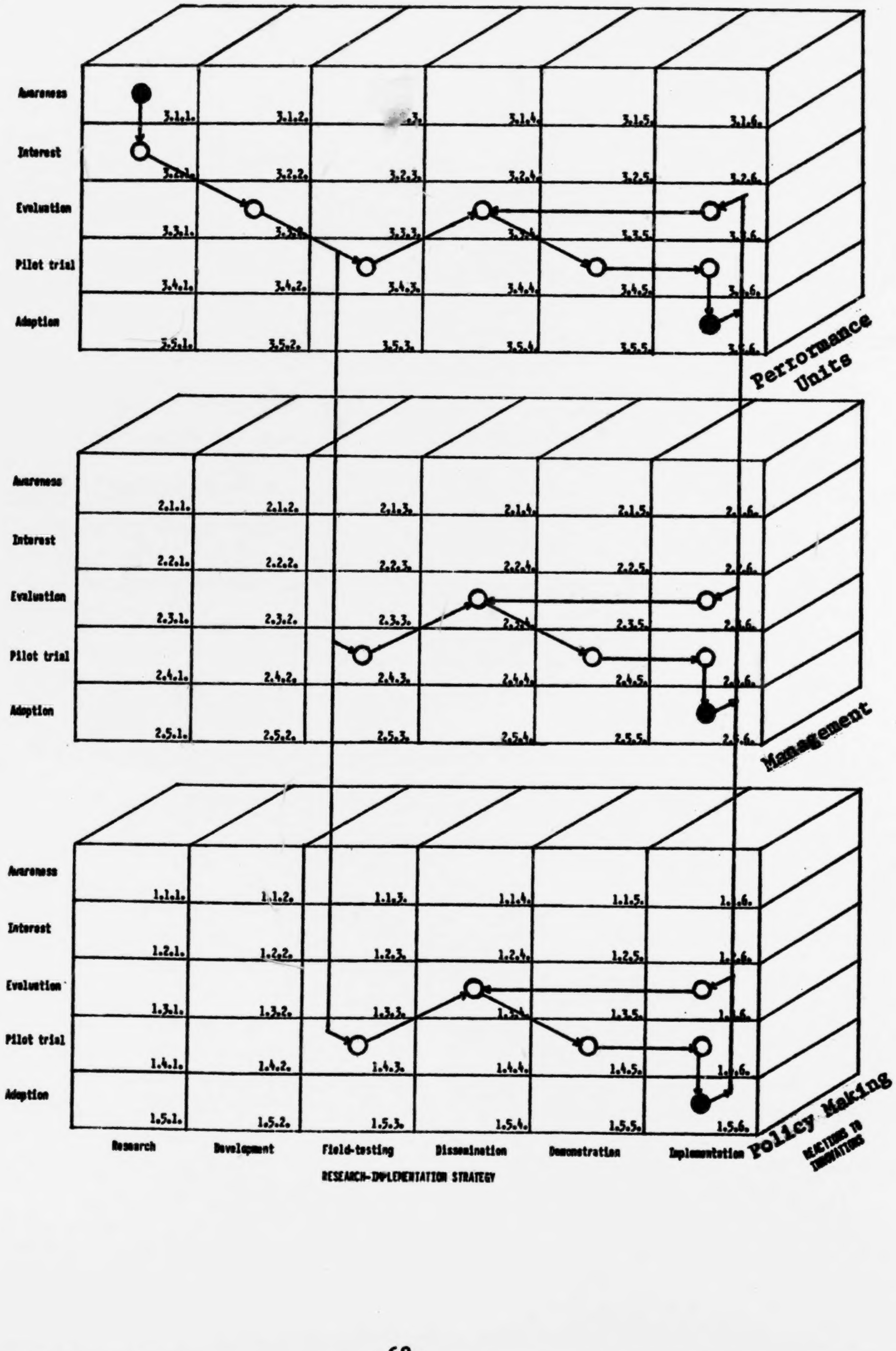
Pilot trials in classroom settings may serve to implement the innovation in the school (5.4.6., 4.4.6., 3.4.6., 2.4.6., 1.4.6.). Results of these crucial trials should serve to stimulate adoption and implementation of the innovation in the instructional program (5.5.6., 4.5.6., 3.5.6., 2.5.6., 1.5.6.). Supervisory help must be provided during pilot trial and implementation processes in order to facilitate adoption and provide reinforcement for individuals' efforts in implementation. Figure 9 reveals the modified-traditional causeway for implementation of innovations in educational practice.

An evaluation of current educational practice by curricula committees representative of grade levels or subject matter areas could also be included in the modular pattern. The implemented practices (1.5.6., 2.5.6., 3.5.6., 4.5.6., 5.5.6.) would be evaluated (1.3.6., 2.3.6., 3.3.6., 4.3.6., 5.3.6.) and research material would be screened (1.3.4., 2.3.4., 3.3.4., 4.3.4., 5.3.4.) for possible use. Resource personnel might be used to aid in the evaluation of disseminated information and help develop demonstration materials for use as pilot trials in in-service training program for teachers (1.4.5., 2.4.5., 3.4.5., 4.4.5., 5.4.5.). The strategy would then follow the course outlined in the preceding paragraph.

This causeway features certain advantages not present in the traditional causeway. These advantages include: (1) providing for an orderly transition of effort between research scientists and educational practitioners reducing the time lag, (2) influencing and involving all levels of organization earlier in the implementation and adoption processes, and (3) providing a protective atmosphere for pilot trials by individual teachers and, thereby, facilitating adoption. The modified-traditional causeway utilizes the same approaches to change that are featured in the traditional causeway. This presents an initial advantage in that it would not be regarded as unduly different. The modifications presented facilitate organization-wide adoption and implementation

FIGURE 9

A Modified-Traditional Causeway for
Implementation of Innovations in Educational Practice



of innovations.

The "New Curricula" Causeway for Implementation of Innovations in Educational Practice

The new curricula in science, mathematics and foreign languages exhibit an interesting pattern of time and involvement when applied to the model. The primary stimuli for the creation of these new curricula resulted largely from a sense of national urgency and evaluation of the products of school instructional programs. Scientists, mathematicians, and linguists developed an awareness that existing programs were not adequately incorporating, nor presenting, new knowledge and technology. A sense of urgency developed due to the international crises emanating from space exploration. A field of influential opinion created forces for change in educational practice and resulted in widespread curricular changes.

The outstanding features of the "New Curricula" causeway are revealed in Figure 10. The broad lines in the figure trace the intended path of implementation for these curricular innovations. The main stages of development for the new curricula include:

1. The evaluation of student products in terms of knowledge and ability to perform on the job. This was used as an evaluation of the instructional program of the school. This evaluation did not involve the institutions, or administrations, but it did involve some key individuals (5.3.6., the weight of public opinion promoted the spread of influence 4.3.6., 3.3.6., 2.3.6., 1.3.6.).

2. Individuals, professional societies, educational agencies, and foundations developed an awareness of the existant need for developing new programs (5.1.2.). Leading educators began to advocate changes causing the influence to spread (4.1.2., 3.1.2., 2.1.2., 1.1.2.).

3. Individuals and agencies were encouraged to develop new programs and interest was created at a rapid rate (5.2.2.). Popular opinion for change continued to grow influencing positive reactions

FIGURE 10

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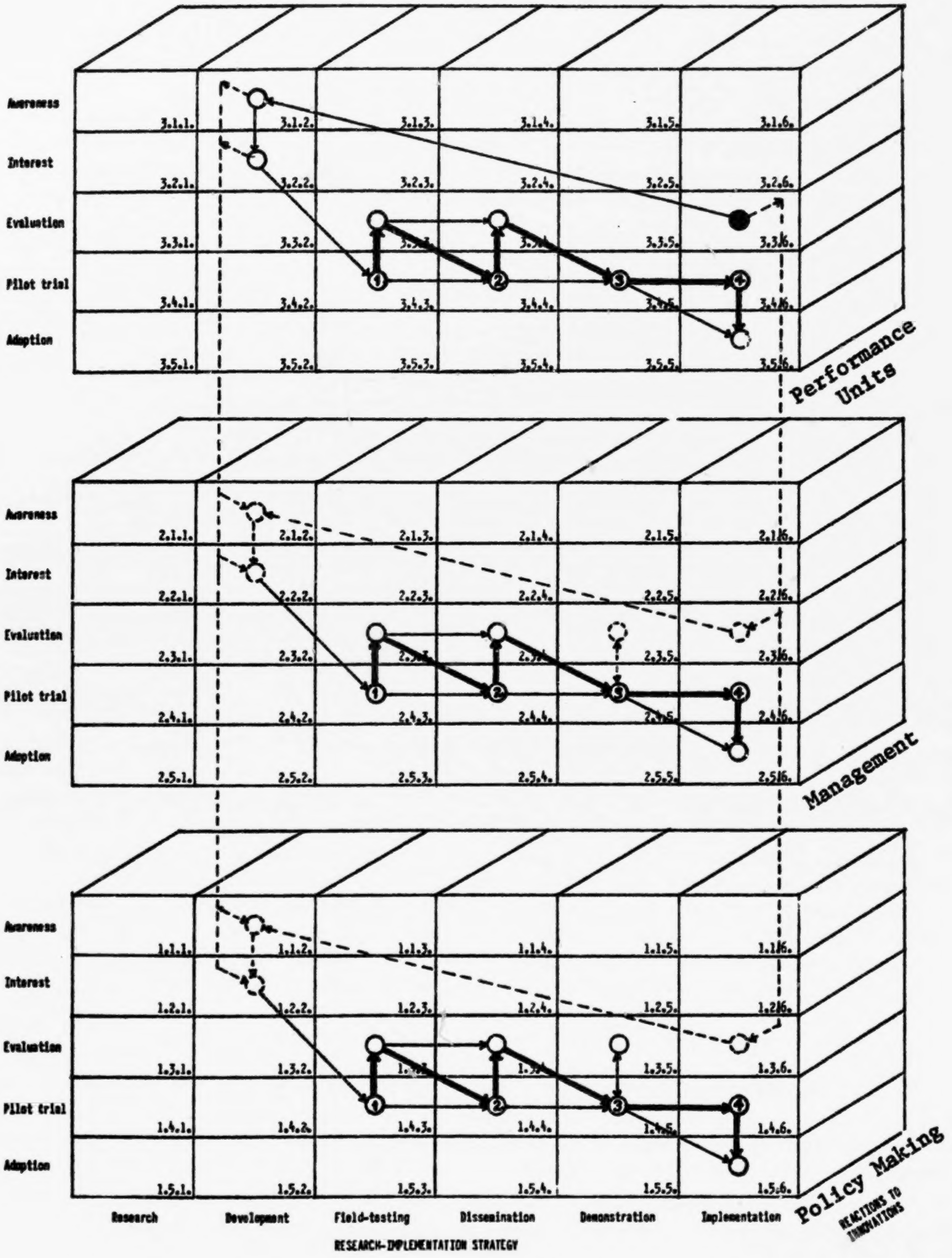


(4.2.2., 3.2.2., 2.2.2., 1.2.2.).

4. Pilot trials were prepared by writing teams and were introduced as field tests in the settings of cooperating schools using key personnel who were associated with, or members of writing teams (1.4.3., 2.4.3., 3.4.3., 4.4.3., 5.4.3.). Cooperating schools frequently had to enter into formal agreements to facilitate these field tests. Organizational agreements were possible at points (1), (2), (3) and (4) along the causeway depending upon the state of development of the curricula.

5. The pilot-trial field tests were evaluated (1.3.3., 2.3.3., 3.3.3., 4.3.3., 5.3.3.) and then disseminated: (1) as evaluations advocating the new curricula (1.3.4., 2.3.4., 3.3.4., 4.3.4., 5.3.4.); or (2) as pilot trials for use in similar school situations in different areas (1.4.4., 2.4.4., 3.4.4., 4.4.4., 5.4.4.).

6. Pilot-trial field tests were also disseminated without benefit of evaluation in cases where schools were eager to try something new (1.4.4., 2.4.4., 3.4.4., 4.4.4., 5.4.4.).

7. Schools engaged in the development of the new curricula participated in second pilot trials (1.4.4., 2.4.4., 3.4.4., 4.4.4., 5.4.4.) and subsequent evaluations (1.3.4., 2.3.4., 3.3.4., 4.3.4., 5.3.4.) from which pilot trial demonstrations and institutes on the new curricula evolved (1.4.5., 2.4.5., 3.4.5., 4.4.5., 5.4.5.).

8. Monitored second pilot trials also led directly to demonstration pilot trials in some schools (1.4.5., 2.4.5., 3.4.5., 4.4.5., 5.4.5.).

9. Institutions frequently evaluated pilot trial demonstrations or sent representatives to institutes for pilot trial, demonstration and/or evaluative purposes (1.3.5., 2.3.5., 3.3.5., 4.3.5., 5.3.5.).

10. Some schools implemented these programs on a trial basis first (1.4.6., 2.4.6., 3.4.6., 4.4.6., 5.4.6.) and then adopted and implemented them into the instructional programs (1.5.6., 2.5.6., 3.5.6., 4.5.6., 5.5.6.). Other schools implemented the pilot-trial demonstrations directly into the instructional program.

The pattern revealed on the model indicates some pertinent factors for consideration during the course of implementation. The influence of public opinion on the levels of organization is obvious but reactions need to be carefully analyzed to determine possible implications for programs of planned change. The early involvement of the policy-making and management levels of organization was required because of the need for management facilitation and financial support. New equipment, instructional materials and supplies had to be purchased in order to introduce the new program. Once purchased the organization was committed, at least in part, to the program on a continuing basis.

More cautious schools adapted parts of the new curricula to the existing program of instruction and experienced modifications on a more gradual basis. This type of behavior clearly demonstrates that the school adopts or modifies the innovation to its needs and at the same time undergoes certain adjustments in order to fit the strengths of the innovation into its performance patterns.

A Post Facto Causeway for Implementation of Innovations in Educational Practice

The post facto causeway for implementation of innovations in educational practice originates with a successful innovation which has been implemented into educational practice on a school-wide or system-wide basis. A valid description explaining the causes for its success is usually lacking. Yet many of these innovations are introduced by skilled teachers and experience district-wide diffusion because they meet certain instructional needs prevalent in the local situation. An analysis of these innovations and the environments which fostered their development is an essential element of study prior to designing programs of planned change.

Successful innovations require a logical rationale and a detailed description before they can be broadly disseminated and evaluated for possible adoption. Professional educators can develop post facto rationales and descriptions for such innovations. The model can be used to reveal a possible strategy for completing such activities.

Figure 11 reveals the following steps that might be used in developing a research-based rationale for an implemented innovation:

1. The innovation has been previously adopted and implemented into educational practice where it is accepted by all levels of organization (1.5.6., 2.5.6., 3.5.6., 4.5.6., 5.5.6.).

2. An evaluation is made of the innovation in its environment to identify some of the indigenous factors which might have contributed to its acknowledged success (1.3.6., 2.3.6., 3.3.6., 4.3.6., 5.3.6.).

3. The primary concern is to develop a research-based rationale which will provide the essential information needed to support diffusion of the innovation in other areas (1.2.1., 2.2.1., 3.2.1., 4.2.1., 5.2.1.).

4. A field assessment is conducted to gain information for possible development (1.3.2., 2.3.2., 3.3.2., 4.3.2., 5.3.2.).

5. A pilot-trial field test is used to try the innovation under controlled conditions (1.4.3., 2.4.3., 3.4.3., 4.4.3., 5.4.3.).

6. An evaluation of the field test is made to support dissemination requirements (1.3.4., 2.3.4., 3.3.4., 4.3.4., 5.3.4.). The completed rationale includes the information derived through field tests and evaluations of the innovation's success in practice.

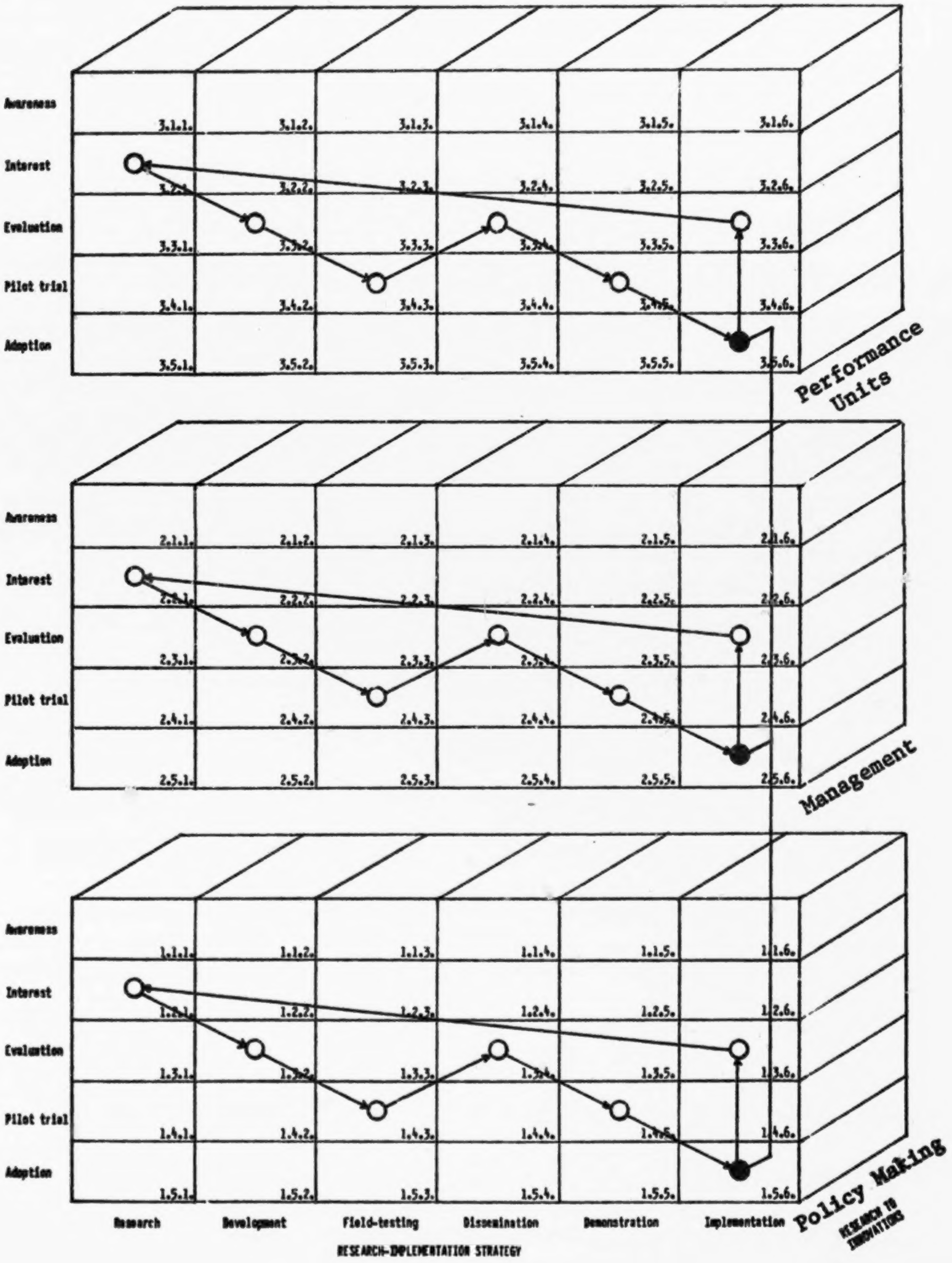
7. Since the research rationale will contribute to the innovation's rates of diffusion and adoption, a link could be established through demonstration to implementation (1.4.5., 2.4.5., 3.4.5., 4.4.5., 5.4.5. and 1.5.6., 2.5.6., 3.5.6., 4.5.6., 5.5.6.).

The developed rationale and description could also be used to study and identify the environmental factors which contributed to the original success of the innovation. A post facto study would also stimulate involvement by all levels of organization. This type of study would also contribute to the establishment of a spirit of collaboration among educational practioners.

In summary, the models presented reveal the time-involvement dimensions for implementation of innovations in educational practice. The functions of

FIGURE 11

A Post Facto Causeway for Implementation
of Innovations in Educational Practice



research may be more fully realized after identification and definition of all implementation factors. A detailed study of the causeways which might be used for implementation of innovations may reveal many significant factors. The model presented may be applied to many situations to evaluate reactions of individuals to innovations. An analysis of the reactions of individuals at different levels of organization may significantly contribute to the current understanding of mechanisms required for innovation in educational practice.

The use of new media in the development of teacher preparation and training materials may provide new insights regarding the adoption and diffusion of educational innovations. Finally, the challenges presented to individuals involved in a study of this type provides a rich and dynamically stimulating opportunity for professional growth and development.